

## Steroidal Sapogenins XLIII.\*

This is a report of the chemical examination of the fourth 1,000 accessions in a survey of plants for steroidal sapogenins and is thus a continuation of the reports on the first three 1,000 accessions (1-6). Data are given for 950 samples, representing 100 families, 272 genera, and 432 identified species. Of these, 14 families, 151 genera, and 376 species are new in this series. Quantitative data are given for the occurrence of 15 steroidal sapogenins, of which two, gentrogenin and correlogenin, are new. Qualitative data are given for the occurrence of these groups of constituents: saponins, flavonoids, alkaloids, tannins, and unsaturated sterols. There is no previously published chemical information on about 50 per cent of the species examined.

**T**HIS IS A CONTINUATION of the previous reports (1-6) on the first three 1,000 accessions. It covers the fourth 1,000 plant samples in our survey of the plant world for steroidal sapogenins, and contains qualitative results for some other constituents. In the collections, emphasis was again placed on species of *Agave*, *Dioscorea*, and *Yucca*, partly because these genera are still the best sources of the steroidal sapogenins, and partly because we have aimed to make the coverage of these three as complete as possible. As a result, *Yucca* is practically complete; *Agave* is about 60 per cent complete, with 160 reasonably available species covered; *Dioscorea* is rather complete as to North and Central America, but the 53 species covered are not more than 9 per cent of the total in this world-wide genus.

### PROCUREMENT

In continuation of the policy established earlier in this program, concentrated collecting was carried on for certain genera—*Dioscorea*, *Agave*, and *Yucca*—particularly in Mexico, but also in Central and South America. Other collecting was concentrated on particular geographical areas rather than individual plant-groups. Among these regions are included Cuba and the Virgin Islands, Chile and Peru, Turkey, South Africa, and the southeastern United States. Large collections of some genera under cultivation at the Plant Introduction Gardens at Glenn Dale, Md., and Coconut Grove, Fla., were

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In order to expedite the examination of such a large number of plant materials, groups of workers were organized, each group handling certain phases of the whole procedure. We gratefully acknowledge the work of J. W. Garvin, Walter Rumph, R. A. Pierce, H. M. Neilson, G. H. Eppley, Theodore Perlstein, H. W. Jones, Samuel Serota, H. A. Walens, and C. R. Eddy.

also supplied for testing. In all, 25 collectors supplied representatives of 101 families included in the 1,000 samples analyzed.

### METHODS

Since many of the sapogenin assays were made on repeat collections, we felt that a procedure somewhat less precise but more rapid than the previously described methods (1, 10) would suffice.

A crude sapogenin sample was obtained by acid hydrolysis and alkali purification as described previously (10). The total crude sample was dissolved in chloroform. An aliquot equivalent to approximately 0.1 gram was taken, evaporated to dryness in a tared beaker and the residue accurately weighed. From the value obtained, the total dry weight of crude sapogenin could be obtained. The residue was then acetylated, dried, and the weight of crude acetate obtained. An infrared determination was then carried out and the percentage of steroidal sapogenin calculated as described previously (10-12).

The individual sapogenins were separated and detected by paper chromatography. For this purpose two systems were used. In both systems approximately 500 micrograms of crude sapogenin (free hydroxyl forms) were placed on Whatman No. 4 paper saturated with an immobile phase. For monohydroxy, nonketonic sapogenins the immobile phase was phenylcellosolve and the moving phase a mixture of 98 parts benzene and 2 parts methanol. In the case of ketonic or dihydroxy sapogenins the fixed phase consisted of propylene glycol and the mobile phase a mixture of 80 parts benzene, 15 parts cyclohexane, and 5 parts methanol. The color developing agent was an ethanolic solution of phosphomolybdic acid.

By using a combination of infrared techniques and paper chromatography the sapogenins could be separated, identified, and listed as to major or minor constituent.

### RESULTS

A compilation of all data is given in Table I, page 654, *et seq.* A summary of the steroidal sapogenins found in this series is given in Table II, page 683, *et seq.*

TABLE I.—SAPOGENINS AND OTHER CONSTITUENTS FOUND IN THE PLANT COLLECTIONS

Accession No.	Species	Source	Date Collected	Plant Part	Code for Plant Parts		Other Codes	Other Codes		
					Hemolysis Test	Total Sapogenins M.F. B., %	Identified % of Total	Flavonoids	Alkaloids	Tannins
Code for Sapogenins (the Suffix "Genin" Omitted)										
c—chloro	m—mano	b—bark	s—stem	ir—infrared analysis						
co—correlo	mk—marko	bu—bulb	sd—seed	mi—micro screening test						
d—dios	p—penno	f—inflorescence	t—tuber	ni—not identified						
dh—d—dehydoroheo	sa—samo	fr—fruit	tw—twig	ns—not sufficient sample						
dm—d—dehydromano	sm—smilia	ib—inflorescent bud	w—whole plant above ground	tr—trace						
g—gito	ss—sarsasapo	l—leaf	wd—wood							
ge—gentro	t—tigo	r—root								
h—heco	y—yucca	rh—rhizome								
k—rammo	ya—yamo									
Code for Source Names										
C. G. F.—U. S. Plant Introduction Garden, Coconut Grove, Fla. (cult.)										
Chico, Cal.—U. S. Plant Introduction Garden, Chico, Cal. (cult.)										
G. D. M.—U. S. Plant Introduction Garden, Glenn Dale, Md. (cult.)										
Hunt. Bot. Gard.—Huntington Botanic Garden, Pasadena, Cal. (cult.)										
Mayaguez, P.R.—Agricultural Experiment Station, U. S. Dept. Agriculture (cult.)										
Collection										
3975	<i>Aphelandra jacobinoides</i>	Tingo Maria, Peru	4/54	1, s	—	....	0	0	0	++
3658	<i>Brillantaisia lamium</i>	C. G. F.	3/54	1, s	—	....	0	0	0	++
3859	<i>Mendoncia pilosa</i>	Tingo Maria, Peru	4/54	1, s	—	....	0	0	+	++
3959	<i>Mendoncia pilosa</i>	Tingo Maria, Peru	4/54	1, s	—	....	0	0	+	++
3951	<i>Senecio pennellii</i>	Tingo Maria, Peru	4/54	1, s	—	....	+	0	0	+
3835	<i>Acer negundo</i>	Wake Co., N. C.	4/54	tw, 1	+	....	0	0	0	++
3933	<i>Acer negundo</i>	Clarke Co., Ga.	4/54	1, s	—	....	0	0	0	++
3731	<i>Acer rubrum</i>	Southport, Brunswick Co., N. C.	4/54	fr	—	....	+	0	+	++
3918	<i>Acer rubrum</i>	Southport, Brunswick Co., N. C.	4/54	1	—	....	0	0	0	++
3922	<i>Chamissoa sp.</i>	Mexico City, Mex.	1/53	sd	—	....	0	0	0	0
3323	<i>Chamissoa sp.</i>	Mexico City, Mex.	1/53	f	—	....	0	0	+	0
3329	<i>Chamissoa sp.</i>	Mexico City, Mex.	1/53	1	+	0	0	0	0	+
3848	<i>Chamissoa sp.</i>	Tingo Maria, Peru	4/54	1, tw	—	....	0	0	0	++
3880	<i>Chamissoa sp.</i>	Carmen Alto, Km. 177, Tingo Maria, Peru	4/54	1, s	+	0	0	0	0	0
3985	<i>Cyathula achyranthoides</i>	Tingo Maria, Peru	4/54	1, s	—	....	0	0	0	0
3019	<i>Agave angustiarum</i>	W. of Iguala, Guer., Mex.	8/52	1	—	....	0	0	0	0
3040	<i>Agave angustiarum</i>	Canyon Iguala, Guer., Mex.	9/52	1	+	0.2	d100	0	0	0
3142	<i>Agave cf. angustiarum</i>	Camatron, Oax., Mex.	9/52	1	+	0	0	0	0	0

8120	<i>Agave angustifolia</i>	N. E. or Cn. Oaxaca, Oax., Mex.	9/52 1	✓ +	0	.....
8128	<i>Agave angustifolia</i>	Istmo. Tehuantepec, Oax., Mex.	9/52 1	+ 0.7	h100	
3491	<i>Agave atrovirens</i>	Zacatepec, Pueb., Mex.	4/53 1	+ 0.2 ir	h; t, m	
3500	<i>Agave applanata</i>	Tulancingo, Hid., Mex.	5/53 1	+ 0.2 ir	h; t, m	
3130	<i>Agave atrorubens</i>	S. Cristobal Casas, Chi., Mex.	9/52 1	+ 0	.....	
8207	<i>Agave atrorubens</i>	Cholula, Pueb., Mex.	10/52 1	+ 0.3 ir	h; dh	
3282	<i>Agave aurea</i>	N. of Comondú, B. C., Mex.	11/50 1	dead	+	.....
3283	<i>Agave aurea</i>	N. of San Xavier, B. C., Mex.	12/52 1	green	+	1.2 ir
3293	<i>Agave aurea</i>	N. of Comondú, B. C., Mex.	11/52 1	+	0.1 ir	h; dh
3304	<i>Agave aurea</i>	N. of Comondú, B. C., Mex.	11/52 1	+	0.1 ir	h; t, m, dm
3294	<i>Agave aurea</i> X. <i>A. sobria</i>	N. of Comondú, B. C., Mex.	11/52 1	+	1.4 ir	h; t, m, dm
3246	<i>Agave brandegeei</i>	S. of LaPaz, B. C., Mex.	11/52 1	+	0.7 ir	h; t, m, dm
3257	<i>Agave brandegeei</i>	Cabo San Lucas, B. C., Mex.	11/52 1	+	1.2 ir	h; dh, t, g, m, dm
3261	<i>Agave brandegeei</i>	S. of LaPaz, B. C., Mex.	11/52 1	+	0	.....
3281	<i>Agave brandegeei</i>	N. of Todos Santos, B. C., Mex.	11/52 1	+	1.1 ir	h; dh
3295	<i>Agave brandegeei</i>	N. of Todos Santos, B. C., Mex.	11/52 1	+	0	.....
3302	<i>Agave brandegeei</i>	S. of Todos Santos, B. C., Mex.	11/52 1	+	0.7 ir	h, m
3311	<i>Agave brandegeei</i>	S. of Todos Santos, B. C., Mex.	11/52 1	+	1.3 ir	t; h
3250	<i>Agave cerulata</i>	Cabo San Lucas, B. C., Mex.	11/52 1	+	3.6	t; h, m, dm
3269	<i>Agave cerulata</i>	Calmalli, B. C., Mex.	12/52 1	+	1.1 ir	h; t, g, m, dm
3273	<i>Agave cerulata</i>	Calmalli, B. C., Mex.	12/52 1	+	0.5 ir	h; t, m, dm
8284	<i>Agave cerulata</i>	N. W. of Laguna Seca Chapaia, B. C., Mex.	12/52 1	dead	+	0.4
3288	<i>Agave cerulata</i>	N. W. of Laguna Seca Chapaia, B. C., Mex.	12/52 1	+	h50; m, dm50	
8289	<i>Agave cerulata</i>	N. W. of Laguna Seca Chapaia, B. C., Mex.	12/52 1	dead	+	0.5 lr
8303	<i>Agave cerulata</i>	E. of San Ignacio, B. C., Mex.	12/52 1	dead	+	1.2 lr
3308	<i>Agave cerulata</i>	N. W. of Laguna Seca Chapaia, B. C., Mex.	12/52 1	dead	+	1.0 lr
3310	<i>Agave cerulata</i>	San Ignacio, B. C., Mex.	12/52 1	dead	+	0.6 lr
3024	<i>Agave collina</i>	N. of Taxco, Guer., Mex.	8/52 1	+	0	.....
3139	<i>Agave collina</i>	N. of Tehuantepec, Caxaca, Mex.	9/52 1	+	0	.....
3041	<i>Af. collina</i>	Pachina, Guer., Mex.	9/52 1	+	1.5 ir	h; t, m, dm
3341	<i>Agave desertii</i>	Pinyon Flats, Sta., Rosa Mt., Cal.	1/53 1	+	0.6 ir	h; m, dm, g
3193	<i>Agave deweyana</i>	Manuel, Tam., Mex.	10/52 1	+	0.1 ir	t; h, m
3099	<i>Agave ferot</i>	Tejupan, Oax., Mex.	9/52 1	+	0	.....
3506	<i>Agave ferot</i>	Tejupan, Oax., Mex.	5/53 1	+	0.4 ir	h; m, dm, t
3162	<i>Agave fourcroydes</i>	N. of Tehuantepec, Oax., Mex.	9/52 1	+	0	.....
3189	<i>Agave fourcroydes</i>	Manuel Tam., Mex.	10/52 1	pulp	-	.....
3438	<i>Agave fourcroydes</i>	San Andres, El Salv.	8/53 1	+	0	.....
3482	<i>Agave fourcroydes</i>	La Casa Garza, Tam., Mex.	5/53 1	+	0.3 ir	t; g, m

Accession No.	Species	Collection Source	Date Collected	Plant Part	Hemolysis Test	Saponins Total M. F. B., %	Identified, % of Total	Flavonoids	Tannins	Alkaloids	Sterols
<b>AMARYLLIDACEAE</b>											
3079	<i>Agave aff. fourcroydes</i>	N. of Miahuatlán, Oax., Mex.	9/52	1	+	0	0.6 ir	t; m	...	...	...
3192	<i>Agave funkiana</i>	Jacala, Hid., Mex.	10/52	1	+	0.6 ir	sm85; y15	m; dm, h	...	...	...
3194	<i>Agave cf. funkiana</i>	Jacala, Hid., Mex.	10/52	1	+	0.6 ir	...	...	...	...	...
3286	<i>Agave goldmaniana</i>	N. W. of Mesquital, B. C., Mex.	12/52	1 dead	+	0.7 ir	m; dm, h	...	...	...	...
32259	<i>Agave goldmaniana</i>	Punta Prieta, B. C., Mex.	12/52	1	+	0.6 ir	h; dh	...	...	...	...
32256	<i>Agave goldmaniana</i>	Punta Prieta, B. C., Mex.	12/52	1 dead	+	0.8 ir	m; dm, t	...	...	...	...
32885	<i>Agave goldmaniana</i>	Punta Prieta, B. C., Mex.	12/52	1	+	0.9 ir	h; m, dm	...	...	...	...
30339	<i>Agave horrida</i>	Taxco, Guer., Mex.	9/52	1	0	0	...	...	...	...	...
3042	<i>Agave horrida</i>	Cuernavaca, Morel., Mex.	9/52	1	0	0	...	...	...	...	...
3043	<i>Agave horrida</i>	Cuernavaca, Morel., Mex.	9/52	1	0	0	...	...	...	...	...
3047	<i>Agave horrida</i>	Cuernavaca, Morel., Mex.	9/52	1	0	0	...	...	...	...	...
3131	<i>Agave aff. horrida</i>	San Mateo Cajones, Oax., Mex.	10/52	1	0	0	...	...	...	...	...
3163	<i>Agave aff. horrida</i>	Zanatepec, Oax., Mex.	9/52	1	0	0	...	...	...	...	...
3038	<i>Agave integrifolia</i>	Tepezontlan, Morel., Mex.	9/52	1	0	0	...	...	...	...	...
3154	<i>Agave kerchovei</i>	Huajuapan, Oax., Mex.	10/52	f	0	0	...	...	...	...	...
3396	<i>Agave letonae</i>	Zamorano, Hond.	2/53	1	0	0.2 ir	t; h	...	...	...	...
3196	<i>Agave lophantha</i>	Mantle, Tam., Mex.	10/52	1	0	0.4 ir	t; h	...	...	...	...
32206	<i>Agave macroacantha</i>	Acuitzington, Ver., Mex.	10/52	1	0	0	...	...	...	...	...
32204	<i>Agave mapisaga</i>	Lagunilla, Hid., Mex.	10/52	fr	-	0	...	...	...	...	...
32205	<i>Agave mapisaga</i>	Cholula, Pueb., Mex.	10/52	1	-	0.06 ir	h; t, dh	...	...	...	...
3074	<i>Agave marmorata</i>	Miahuatlán, Oax., Mex.	9/52	1	-	0.15	sm35; c65	...	...	...	...
3105	<i>Agave marmorata</i>	Tehuixtzingo and Acatlán, Pueb., Mex.	9/52	1	-	0.6	sm100	...	...	...	...
3121	<i>Agave marmorata</i>	S. of Acatlán, Pueb., Mex.	9/52	1	+	0	...	...	...	...	...
3153	<i>Agave mescal</i>	S. Christobal Casas, Chia., Mex.	9/52	1	0	0	...	...	...	...	...
3160	<i>Agave mescal</i>	S. Christobal Casas, Chia., Mex.	9/52	1	+	0	...	...	...	...	...
3490	<i>Agave mirabilis</i>	Jalapa, Ver., Mex.	4/53	1	+	0.6 ir	h; t, g, m, dm	...	...	...	...
32028	<i>Agave mitraciformis</i>	Tehuacan, Pueb., Mex.	10/52	fr	0	0.3 ir	h; dh, g	...	...	...	...
2247	<i>Agave nebrownii</i>	San Fernando, B. C., Mex.	12/52	1	1	1.3	m80; dm20	...	...	...	...
3248	<i>Agave nebrownii</i>	San Fernando, B. C., Mex.	12/52	1	2	2.5 ir	m; dm, h, t	...	...	...	...
3249	<i>Agave nebrownii</i>	San Fernando, B. C., Mex.	12/52	1	0	0.6	m, dm	...	...	...	...
3286	<i>Agave nebrownii</i>	San Fernando, B. C., Mex.	12/52	1	2	2.2 ir	t; m, h, dm	...	...	...	...
3272	<i>Agave nebrownii</i>	San Fernando, B. C., Mex.	12/52	1 dead	1	1.3 ir	h; t, m, dm	...	...	...	...
3298	<i>Agave nebrownii</i>	San Fernando, B. C., Mex.	5/53	1	1	1.0 ir	t, m, h, dh, dm	...	...	...	...
3514	<i>Agave nebrownii</i>	San Fernando, B. C., Mex.	5/53	1	1	1.1 ir	m, dm, t; g, h	...	...	...	...
3104	<i>Agave paumanniiana</i>	Nochistlán, Oax., Mex.	9/52	1	0	0.4	h100	...	...	...	...
3149	<i>Agave polystachya</i>	Zacatepec, Mixes, Oax., Mex.	9/52	1	0	0	...	...	...	...	...
3195	<i>Agave poyacana</i>	Jacala, Hid., Mex.	10/52	1	0	0	...	...	...	...	...
32509	<i>Agave porrecta</i>	Maricopa Forest, P. R.	5/53	1	0	0.5 mi	...	...	...	...	...
3078	<i>Agave potatorum</i>	N. E. of Cd. Oaxaca, Mex.	9/52	1	0	0	...	...	...	...	...
3156	<i>Agave potatorum</i>	Tuxtla Gutierrez, Chia., Mex.	9/52	1	0	0	...	...	...	...	...

3233	<i>Agave promontorii</i>	Balboa Park, San Diego, Cal.	11/52	1	+ 0 .....
3245	<i>Agave promontorii</i>	Balboa Park, San Diego, Cal.	12/52	1b	+ 0 .....
3252	<i>Agave promontorii</i>	W. base of Sierra Laguna, B. C., Mex.	11/52	1	+ 0.4 ir t; m .....
3262	<i>Agave promontorii</i>	W. base of Sierra Laguna, B. C., Mex.	11/52	1	+ 3.4 ir h; dh, m, t .....
3266	<i>Agave promontorii</i>	Rancho Burrera, Sierra Laguna, B. C., Mex.	11/52	1b	+ 0.2 ir h; t .....
3270	<i>Agave promontorii</i>	W. summit of Sierra Laguna, B. C., Mex.	11/52	1	+ 0.8 ir h; m, dm .....
3275	<i>Agave promontorii</i>	W. Summit of Sierra Laguna, B. C., Mex.	11/52	1	+ 0.4 ir h; dh .....
3287	<i>Agave promontorii</i>	W. summit of Sierra Laguna, B. C., Mex.	11/52	1	+ 0.7 ir h; t, dh .....
3291	<i>Agave promontorii</i>	W. summit of Sierra Laguna, B. C., Mex.	11/52	1	+ 0.9 ir t; m .....
3296	<i>Agave promontorii</i>	W. summit of Sierra Laguna, B. C., Mex.	11/52	1	+ 0.9 ir h; m, dh, dm .....
3299	<i>Agave promontorii</i>	W. summit of Sierra Laguna, B. C., Mex.	11/52	1	+ 0.5 ir h; dh .....
3309	<i>Agave promontorii</i>	W. summit of Sierra Laguna, B. C., Mex.	11/52	1	+ 0.8 ir h; t, g, m .....
3331	<i>Agave promontorii</i>	Sierra Laguna, B. C., Mex.	11/52	1	+ 0.5 ir h; t, m, dm .....
3068	<i>Agave roezliana</i>	Miahuatlan, Oax., Mex.	9/52	1	+ 0.9 mi .....
3258	<i>Agave roseana</i>	N. of Punta Frailes, B. C., Mex.	11/52	1	+ 1.4 ir t; h .....
3263	<i>Agave roseana</i>	N. of Punta Frailes, B. C., Mex.	11/52	1	+ 1.7 ir t; h .....
3279	<i>Agave roseana</i>	N. of Punta Frailes, B. C., Mex.	11/52	1	+ 1.9 ir h; t, g, m .....
3297	<i>Agave roseana</i>	N. of Punta Frailes, B. C., Mex.	11/52	1	+ 1.3 ir t; g, h, dh .....
3307	<i>Agave roseana</i>	N. of Punta Frailes, B. C., Mex.	11/52	1	+ 0 .....
3222	<i>Agave salmiana</i>	Cheran, Michoac., Mex.	10/52	1	+ 0 .....
3184	<i>Agave scabra</i>	Chisos Mts., Tex.	10/52	fr	+ 0.8 mi m, dm; h .....
3338	<i>Agave scabra</i>	Big Bend Nat. Park, Alpine, Tex.	1/53	1	+ 0 .....
3339	<i>Agave scabra</i>	Big Bend Nat. Park, Alpine, Tex.	1/53	fr, sd	+ 0 .....
3340	<i>Agave scabra</i>	Big Bend Nat. Park, Alpine, Tex.	1/53	s	+ 0 .....
3467	<i>Agave aff. schidigera</i>	Los Mochis, Sin., Mex.	3/53	1	+ 1.2 ir d; h, g, m .....
3463	<i>Agave schottii</i>	Bachaca, Son., Mex.	3/53	1	+ 0.7 ir c; t .....
3157	<i>Agave seemanniana</i>	Mesa de Copoya, Chia., Mex.	9/52	1	+ 0 .....
3426	<i>Agave seemanniana</i>	Teguacalpa, Hondu.	3/53	1	+ 0 .....
3251	<i>Agave sobria</i>	Bahia Concepcion, B. C., Mex.	12/52	1	+ 0.2 .....
3268	<i>Agave sobria</i>	Comondut, B. C., Mex.	12/52	1	+ 0.5 ir h; t, m .....
3278	<i>Agave sobria</i>	Bahia Concepcion, B. C., Mex.	12/52	1	+ 0 .....

Accession No.	Species	Collection No.	Source	Date Collected	Plant Part	Hemolysis Test	Total M. F. B., %	Identified % of Total	Flavonoids	Tannins	Sterols
<b>AMARYLLIDACEAE</b>											
3280	<i>Agave sobria</i>	Comondu, B. C., Mex.	12/52 1 dead			+	0.4 ir	m; g; h			
3300	<i>Agave sobria</i>	Sierra Giganta, B. C., Mex.	12/52 1			++	0				
3301	<i>Agave sobria</i>	Bahia Concepcion, B. C., Mex.	12/52 1			+++	0.2 ir	h; t; dh, m			
3306	<i>Agave sobria</i>	Sierra Giganta, B. C., Mex.	12/52 1			+++	0.6 ir	h; t, m			
3287	<i>Agave sullivantii</i>	San Antonio, B. C., Mex.	11/52 1			+++	1.3 ir	m; h; dmt			
3457	<i>Agave toumeyana</i>	Magna Copper Mines, Ariz.	3/53 1			++++	1.5 mi				
3492	<i>Agave toumeyana</i>	Sacaton, Ariz.	4/53 1			++++	1.8 ir	h, m, dm; t; g			
3555	<i>Agave toumeyana</i>	B. Benson, Kingman, Ariz.	11/53 1			++++	1.5 ir	h, m, dm; g			
3069	<i>Agave verschaffeltii</i>	N. E. of Cd. Oaxaca, Mex.	8/52 1			++++	0.15	t65			
3073	<i>Agave verschaffeltii</i>	Yanhuitlan, Oax., Mex.	9/52 1			++++	0				
3075	<i>Agave verschaffeltii</i>	Miabastlan, Oax., Mex.	9/52 1			++++	0.6	t100			
3082	<i>Agave verschaffeltii</i>	N. E. of Cd. Oaxaca, Mex.	9/52 1			++++	0				
3199	<i>Agave verschaffeltii</i>	Tehuacan, Pue., Mex.	10/52 fr			++++	0.9 ir	t; h			
3151	<i>Agave af. verschaffeltii</i>	Comitan, Chiapas, Mex.	9/52 1			++++	0				
3271	<i>Agave verrens</i>	Comondu, B. C., Mex.	11/52 1			++++	0.8 ir	h; m, dm			
3292	<i>Agave verrens</i>	Comondu, B. C., Mex.	11/52 1			++++	0.4 ir	h; dh, m			
3314	<i>Agave vilmoriniana</i>	Hunt, Bot. Gard.	12/52 s			++++	0.4 ir	sm; h			
3317	<i>Agave vilmoriniana</i>	Hunt, Bot. Gard.	12/52 1			++++	1.5 ir	sm100			
3462	<i>Agave vilmoriniana</i>	San Bernardo, San., Mex.	4/53 1			++++	3.2				
3070	<i>Agave sp.</i>	Ixtlan, Oax., Mex.	9/52 1			++++	3.3	sm80; y15; g5			
3071	<i>Agave sp.</i>	Ixtlan, Oax., Mex.	9/52 1			++++	0				
3077	<i>Agave sp.</i>	N. of Miahuan, Oax., Mex.	9/52 1			++++	0.05	h35; c40; m, dm25			
3102	<i>Agave sp.</i>	Tenitzingo, Fueb., Mex.	9/52 1			++++	0.4	t100			
3120	<i>Agave sp.</i>	N. of Devil's Riv., Del Rio, Tex.	10/52 1			++++	0.8	ss100			
3122	<i>Agave sp.</i>	Sen. Mateo Cajones, Oax., Mex.	10/52 1			++++	1.0 mi	.....			
3123	<i>Agave sp.</i>	Tuxtla Gutierrez, Chia., Mex.	9/52 1			+	0.5 mi	.....			
3124	<i>Agave sp.</i>	Comitan, Chia., Mex.	9/52 1			+	0.4	h100			
3126	<i>Agave sp.</i>	Sierra Zempoaltepec, Oax., Mex.	9/52 1			+	0.15	h100			
3132	<i>Agave sp.</i>	Sierra Zempoaltepec, Oax., Mex.	9/52 1			+	0.7	h; dh 80; n120			
3138	<i>Agave sp.</i>	Cintalapa, Chia., Mex.	9/52 1			+	0	.....			
3141	<i>Agave sp.</i>	Sierra Zempoaltepec, Oax., Mex.	9/52 1			+	0	.....			
3149*	<i>Agave sp.</i>	Mita, Oax., Mex.	10/52 Pulp			+	0	.....			
3164	<i>Agave sp.</i>	Comitan, Chia., Mex.	9/52 1			+	0.2 mi	.....			
3166	<i>Agave sp.</i>	San Mateo Cajones, Oax., Mex.	9/52 1			+	0	.....			
3167	<i>Agave sp.</i>	Tehuantepec, Oax., Mex.	9/52 1			+	0.2 mi	.....			
3190	<i>Agave sp.</i>	Jacala, Hid., Mex.	10/52 1			+	0	.....			
3191	<i>Agave sp.</i>	Jacala, Hid., Mex.	10/52 1			+	0.4 ir	t			
3220	<i>Agave sp.</i>	E. of Carapan, Michoa., Mex.	10/52 1			+	0	.....			



Accession No.	Species	Source	Date Collected	Plant Part	Hemol. Ysis Test		Saponins Total, %	Saponins Identified, % of Total	Flavo- noids	Alkaloids	Tannins	Sterols
					AMARYLLIDACEAE	M. F. B., %						
3072	<i>Manfreda maculata</i>	N. E. of Cd. Oaxaca-Ixtlan, Mex.	8/52 1	+	0.2	g50; h, dh20; d30	0	0	0	0	0	0
3101	<i>Manfreda maculata</i>	Sierra Ixtacihuatl, Mex.	9/52 1	+	1.5	t25; g35; c40	0	0	0	0	0	0
3080	<i>Manfreda pringlei</i>	N. E. of Cd. Oaxaca-Ixtlan, Mex.	9/52 1	+	0.7 mi	g100	0	0	0	0	0	0
3020	<i>Manfreda</i> sp.	N. of Narango-Taxco, Guer., Mex.	8/52 r	+	0.2	g75; d25	0	0	0	0	0	0
3023	<i>Manfreda</i> sp.	N. of Narango-Taxco, Guer., Mex.	8/52 r	+	0.3 mi	.....	0	0	0	0	0	0
3061	<i>Manfreda</i> sp.	Tepoztlan, Morel, Mex.	9/52 r	+	0.6	g100	0	0	0	0	0	0
3103	<i>Manfreda</i> sp.	Sierra Ixtacihuatl, Mex.	9/52 r	+	0.1	g100	0	0	0	0	0	0
3232	<i>Pascalia maritimum</i>	Karakali, Mugla, Turkey	11/52 bu	+	0	.....	0	0	0	++	0	0
3016	<i>Cyrtocarpa procera</i>	W. of Iguala, Guer., Mex.	8/52 r	+	0	.....	0	0	0	0	0	0
3058	<i>Schinopasis lorenzii</i>	C. G. F.	9/52 r	-	..	.....	0	0	0	0	0	0
3902	<i>Schinus molle</i>	Quilca, Lima, Peru	4/54 1, tw, b	-	..	.....	0	0	0	0	0	0
3030	<i>Annona bullata</i>	C. G. F.	9/52 1	-	..	.....	0	0	0	0	0	0
3045	<i>Thechezia</i> sp.	Ixcateopan, Guer., Mex.	9/52 fr	+	0	.....	0	0	0	+	+	+
3801	<i>Urechites lutea</i>	Atkins Gard., Soledad, Cuba	2/54 1, s, fr	-	..	.....	0	0	0	+	+	+
3725	<i>Ilex coriacea</i>	Southport, Brunswick Co., N. C.	4/54 1, tw	-	..	.....	+	0	0	0	+	+
3589	<i>Ilex glabra</i>	Southport, Brunswick Co., N. C.	2/54 1, s	-	..	.....	+	0	0	0	+	+
3711	<i>Ilex glabra</i>	Wayne Co., Ga.	3/54 1	-	..	.....	0	0	0	+	+	+
3715	<i>Ilex myrtifolia</i>	Wayne Co., Ga.	3/54 1	-	..	.....	0	0	0	+	+	+
3880	<i>Ilex spaca</i>	Raleigh, N. C.	3/54 1, tw	-	..	.....	0	0	0	0	0	+
3778	<i>Ilex vomitoria</i>	McIntosh Co., Ga.	4/54 1, s	-	..	.....	0	0	0	0	0	+
3874	<i>Dieffenbachia cordata</i>	Cayumba, Tingo Maria, Peru	4/54 1, s	-	..	.....	0	0	0	0	0	+
3724	<i>Hedera helix</i>	Wake Co., N. C.	4/54 1, tw	+	0	.....	+	0	0	0	0	+
3107	<i>Aristolochia</i> sp.	ARISTOLOCHIACEAE	9/52 1, s, r	-	..	.....	0	0	0	0	0	+
3648	<i>Herastylis aristolia</i>	G. D. M. Oglethorpe Co., Ga.	3/54 1, s	-	..	.....	0+	0	0	0	0	+
3831	<i>Podophyllum peltatum</i>	Raleigh, N. C.	4/54 1	-	..	.....	+	0	0	0	0	++

				<b>BETULACEAE</b>				
3929	<i>Alnus serrulata</i>	Oglethorpe Co., Ga.	4/54 1, s	-	...	...	++	+
3987	<i>Amphilophium aschersonii</i>	Peru	4/54 1, s	-	0	0	0	+
3534	<i>Arygia sp.</i>	Cuesta de los Cardas, Chile	11/53 t	+	0	0	0	+
3857	<i>Callichlamys latifolia</i>	E. of Tingo Maria, Peru	4/54 1, s, r	-	...	+	+	+
3031	<i>Pachira insignis</i>	C. G. F.	9/52 1	-	...	0	0	0
3011	<i>Cordia nitida</i>	C. G. F.	8/52 1	-	...	0	0	0
3034	<i>Cordia serratifolia</i>	C. G. F.	9/52 1	-	...	0	0	+
3035	<i>Cordia serratifolia</i>	C. G. F.	9/52 1	-	...	0	0	+
3945	<i>Cordia sp.</i>	W. of Tingo Maria, Peru	4/54 1, s	-	...	+	+	+
3903	<i>Cordia sp.</i>	Quilca, Lima, Peru	4/54 1, s	-	...	0	0	+
3801	<i>Heliotropium anchusaeifolium</i>	Toombs Co., Ga.	4/54 1, s	-	...	0	0	+
3878	<i>Heliotropium sp.</i>	Carmen Alto, Tingo Maria, Peru	4/54 1, s	-	...	0	0	+
3990	<i>Heliotropium sp.</i>	Rd. to Puerto Nuevo, Tingo Maria, Peru	4/54 1, s	-	...	0	0	+
3776	<i>Lithospermum arvense</i>	Clarke Co., Ga.	4/54 1, s	+	0	...	+	+
3342	<i>Simmondsia chinensis</i>	Aquanga, Cal.	12/52 1	-	...	0	0	+
3343	<i>Simmondsia chinensis</i>	Aquanga, Cal.	12/52 1	-	...	0	0	+
3224	<i>Ferocactus sp.</i>	Mexico City, Mex.	12/52 1	+	0	...	0	0
3277	<i>Peniocereus greggii</i>	N. of San Xavier, B. C., Mex.	12/52 r	-	...	0	0	0
3961	<i>Siphocampylus sp.</i>	Peru	4/54 1, s, b	-	...	0	0	0
3899	<i>Lobelia decurrens</i>	Bet. Chancay and Huacho, Lima, Peru	4/54 1, s	-	...	0	0	+
3937	<i>Lonicera maackii</i>	Clarke Co., Ga.	4/54 1, s	-	...	0	0	+
3691	<i>Sambucus canadensis</i>	McIntosh Co., Ga.	3/54 1, tw	-	...	0	0	+
3795	<i>Sambucus simplicifolia</i>	Wake Co., N. C.	4/54 1	-	...	0	0	+
3840	<i>Viburnum nudum</i>	Raleigh, N. C.	4/54 1, fl, fl	-	...	0	0	+
3837	<i>Viburnum prunifolium</i>	Southport, Brunswick Co., N. C.	4/54 1, tw	-	...	0	0	+
3914	<i>Viburnum recognitum</i>							
3647	<i>Stellaria media</i>	Clarke Co., Ga.	3/54 w	-	...	0	0	+
3597	<i>Casuarina fraseri (cult.)</i>	Soledad, Cuba	2/54 1, s	-	...	+	0	+
3907	<i>Casuarina montana</i>	C. G. F.	8/52 1	-	...	0	0	+

Access- ion No.	Species	Collection Source	Date Collected	Plant Part	Saponins, Identified, % of Total			Flavo- noids	Alkaloids	Tannins	Sterols
					Hemol- ysis Test	M. F. B., %	% of Total				
<b>CHENOPodiaceae</b>											
3769	<i>Chenopodium album</i>	Oglethorpe Co., Ga. McIntosh Co., Ga.	4/54 4/54	1, s 1, s	+	0	.....	0	0	0	+++
3782	<i>Salicornia perennis</i>	Soledad, Cuba Tingo Maria, Peru Tingo Maria, Peru	4/54 4/54 4/54	1, s 1, s b	-	-	.....	0	0	0	++
<b>Clusiaceae</b>											
3599	<i>Clusia rosea</i> (cult.)	Tingo Maria, Peru	2/54	1	-	-	.....	0	0	0	++
3870A	<i>Clusia</i> sp.	Tingo Maria, Peru	4/54	1, s	-	-	.....	0	0	0	++
3870B	<i>Clusia</i> sp.	Tingo Maria, Peru	4/54	b	-	-	.....	0	0	0	++
<b>Combretaceae</b>											
3008	<i>Terminalia calamansanay</i>	C. G. F. C. G. F. C. G. F.	8/52 9/52 8/52	1 1 1	-	-	.....	0	0	0	++
3054	<i>Terminalia superba</i>				-	-	.....	0	0	0	++
3004	<i>Terminalia triflora</i>				-	-	.....	0	0	0	++
<b>CommeLLaceae</b>											
3875	<i>Campelia sancta</i>	Tingo Maria, Peru	4/54	1, s	-	-	.....	0	0	0	++
3886	<i>Dichorisandra hexandra</i>	Tingo Maria, Peru	4/54	w	-	-	.....	0	0	0	++
3956	<i>Dichorisandra hexandra</i>	Rio Monzon, Tingo Maria, Peru	4/54	1, s	-	-	.....	0	0	0	++
3021	<i>Tradescantia</i> sp.	Iguala, Guer., Mex.	8/52	w	+	0	.....	0	0	0	++
<b>Composite</b>											
3791	<i>Baccharis angustifolia</i>	McIntosh Co., Ga. Southport, Brunswick Co., N. C.	4/54 4/54	1, s 1, tw	-	-	.....	0	0	0	++
3726	<i>Baccharis halimifolia</i>	McIntosh Co., Ga.	4/54	1	+	0	.....	0	0	0	++
3792	<i>Borrichia frutescens</i>	Raleigh, N. C.	3/54	w	-	-	.....	0	0	0	++
3683	<i>Centaurea cyanus</i>	Clarke Co., Ga.	4/54	1	-	-	.....	0	0	0	++
3805	<i>Chrysanthemum leucanthemum</i>	Clarke Co., Ga.	4/54	1, s	-	-	.....	0	0	0	++
3926	<i>Chrysogonum virginicum</i>	Southport, Brunswick Co., N. C.	4/54	f	+	0	.....	0	0	0	++
3913	<i>Cichorium intybus</i>	Raleigh, N. C.	4/54	w	-	-	.....	0	0	0	++
3721	<i>Cirsium horridulum</i>	McIntosh Co., Ga.	4/54	1, s	-	-	.....	0	0	0	++
3788	<i>Cirsium heterophyllum</i>	Bet. Puente Prado and Las Palmas, Tingo Maria, Peru	4/54	1, s	-	-	.....	0	0	0	++
3974	<i>Clibadium divaricatum</i>	Clarke Co., Ga.	3/54	1	-	-	.....	0	0	0	++
3644	<i>Cnicus benedictus</i>	Southport, Brunswick Co., N. C.	4/54	w	-	-	.....	0	0	0	++
3922	<i>Conephrys boswellii</i>	Raleigh, N. C.	4/54	w	-	-	.....	0	0	0	++
3841	<i>Erigeron annuus</i>	Cayotenango, Dept. Such., Guat.	3/53	r	+	0	.....	0	0	0	++
3454	<i>Eupatorium</i> sp.	Southport, Brunswick Co.	4/54	1	-	-	.....	0	0	0	++
3730	<i>Gaillardia pulchella</i>	Oglethorpe Co., Ga.	4/54	1	-	-	.....	0	0	0	++
3765	<i>Gnaphalium purpureum</i>	Quilca, Lima, Peru	4/54	1, s	-	-	.....	0	0	0	++
3904	<i>Helianthus</i> sp.	Oglethorpe Co., Ga.	3/54	1, s	-	-	.....	0	0	0	++
3649	<i>Heirotheca subarillaris</i>	Southport, Brunswick Co., N. C.	3/54	1, tw	-	-	.....	0	0	0	++
3727	<i>Inula frutescens</i>				-	-	.....	0	0	0	++



Accession No.	Species	Source	Date Collected	Plant Part	DIOSCOREACEAE		Hemolysis Test	M.F.B., %	Saponins Identified, % of Total	Flavonoids	Alkaloids	Tannins	Sterols
3125	<i>Dioscorea barillettii</i>	Rancho Ocote, Chia., Mex.	10/52	r	+	0.33	ya100						
3385	<i>Dioscorea barillettii</i>	Sebol, Alta Verapaz, Guat.	2/53	r, t	+	0							
3389	<i>Dioscorea barillettii</i>	Pa-zos, Alta Verapaz, Guat.	2/53	t	+	0.8	d50; ya50						
3485	<i>Dioscorea barillettii</i>	El Palmer, Ver., Mex.	5/53	r	+	0.3	ya80; d20						
3113	<i>Dioscorea composita</i>	G. D. M.	9/52	rh	+	0.2	mi						
3200*	<i>Dioscorea composita</i>	Tierra Blanca, Ver., Mex.	10/52	r	+	10.1*	d100						
3201	<i>Dioscorea composita</i>	Tuxtepec, Oax., Mex.	10/52	r	+	3.1	d100						
3202	<i>Dioscorea composita</i>	Tuxtepec, Oax., Mex.	10/52	r	+	2.4	d100						
3384	<i>Dioscorea composita</i>	Sebol, Alta Verapaz, Guat.	2/53	r	+	0.03	d100						
3390	<i>Dioscorea composita</i>	Panzos, Alta Verapaz, Guat.	2/53	r	+	0							
3392	<i>Dioscorea composita</i>	W. of Estor, Izabal, Guat.	2/53	r	+	2.6	d90; ni0						
3450	<i>Dioscorea composita</i>	Sinahu, Alta Verapaz, Guat.	3/53	t	+	0							
3486	<i>Dioscorea composita</i>	El Palmer, Ver., Mex.	5/53	t	+	5.0	d90; ya10						
3487	<i>Dioscorea composita</i>	Sierra Blanca, Ver., Mex.	5/53	t	+	0							
3501	<i>Dioscorea composita</i>	Martinez de la Torre, Ver., Mex.	6/53	t	+	2.9	d100						
3504	<i>Dioscorea composita</i>	El Suchill, Ver., Mex.	5/53	t	+	5.4	d100						
3505	<i>Dioscorea composita</i>	Huachil: a. go, Ver., Mex.	5/53	t	+	3.4	d100						
3518	<i>Dioscorea composita</i>	G. D. M.	4/53	r, t	+	0							
3519	<i>Dioscorea composita</i>	G. D. M.	4/53	r, t	+	0							
3048	<i>Dioscorea contorta</i>	Cuernavaca, Morel., Mex.	9/52	rh	0	0	0						
3461	<i>Dioscorea colomifolia</i>	Natal, S. Africa	2/53	r	0	0							
3442	<i>Dioscorea dregeana</i>	Natal, S. Africa	2/53	r	0	0							
3135	<i>Dioscorea dugesii</i>	Turtla Gutierrez, Chia., Mex.	10/52	r	0	0							
3171	<i>Dioscorea hemirhizpta</i>	G. D. M.	10/52	t	0	0	+						
3015	<i>Dioscorea lobata</i>	W. of Iguala, Guer., Mex.	8/52	rh	0	0							
3136	<i>Dioscorea macrostachya</i>	Rancho Ocote, Chia., Mex.	10/52	r	0.3	d100							
3347	<i>Dioscorea macrostachya</i>	El. Progreso, Guat.	1/53	t	0.15	d+ ya100							
3402	<i>Dioscorea macrostachya</i>	S. W. of La Ceiba, Atlantida, Hond.	3/53	r	1.5	d100							
3353	<i>Dioscorea nelsonii</i>	La Lima, Hond.	1/53	r	+	0.04	d100						
3403	<i>Dioscorea nelsonii</i>	Lancetilla Sta., Atl. antida, Hond.	3/53	r	+	1.4	d100						
3404	<i>Dioscorea nelsonii</i>	W. of Ceiba, Atlantida, Hond.	3/53	r	+	1.8	d100						
3018	<i>Dioscorea platycarpa</i>	W. of Iguala, Guer., Mex.	8/52	rh	+	0.4	d100						
3397	<i>Dioscorea polygonoides</i>	Zamorano, Hond.	2/53	r	+	0.25	d100						
3570	<i>Dioscorea sataulis</i>	Ranagua, O'Higgins Prov., Chile	11/53	r	+	0							
3571	<i>Dioscorea sataulis</i>	Ranagua, O Higgins Prov., Chile	11/53	r	+	0							
3178	<i>Dioscorea sinuata</i>	G. D. M.	10/52	t	+	0							
3140	<i>Dioscorea spiculiflora</i>	Tuxtla Gutierrez, Chia., Mex.	10/52	r	+	1.5	d+ya75; co+ge25						
3513	<i>Dioscorea spiculiflora</i>	Tuxtla Gutierrez, Chia., Mex.	6/53	t	+	2.7	d+ya85; co+ge15						
3823	<i>Dioscorea siegemanniana</i>	Huallaga Riv., Tingo Maria, Peru	4/54	rh	0	0							



Act <sup>a</sup> sign No.	Species	Source	Date Collected	Plant Part	DIOSCOREACEAE		Alkaloids	Tannins	Sterols
					Hemol- ysis Test	Saponins, Total, M. F. B., %	Identified, % of Total		
<b>DIOSCOREACEAE</b>									
3185	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	tb	+	2.3	d99; p1	0	..
3186	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	r	+	0.5	d100	0	+
3187	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	r	++	2.1	d100	0	..
3188	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	s, t	++	0	..	++	+
3198	<i>Dioscorea</i> sp.	Cordoba, Ver., Mex.	10/52	r	++	0	..	..	..
3209	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	r	-	..	..	0	0
3210	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	r	-	..	..	0	0
3211	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	r	-	..	..	0	0
3212	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	r	-	..	..	0	0
3223	<i>Dioscorea</i> sp.	Apatzingan, Michoac., Mex.	10/52	t	++	0.8	d100	0	0
3226	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	r	++	0.5	d75; ni25	0	0
3227	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	r	++	4.4	d100	0	0
3228	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	r	++	0.3	d100	0	0
3229	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	r	++	0	..	++	0
3230	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	t	++	0	..	0	0
3231	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	r	++	0	..	0	0
3234	<i>Dioscorea</i> sp.	Puerto Barrios, Izabal, Guat.	10/52	r	++	0	..	0	0
3235	<i>Dioscorea</i> sp.	Guatemala City, Guat.	10/52	r	++	0	..	0	0
3236	<i>Dioscorea</i> sp.	Guatemala City, Guat.	10/52	b	++	0	..	0	0
3237	<i>Dioscorea</i> sp.	Guatemala City, Guat.	10/52	s	++	0	..	0	0
3238	<i>Dioscorea</i> sp.	Guatemala City, Guat.	10/52	r	++	0	..	0	0
3239	<i>Dioscorea</i> sp.	Turrialba, Costa Rica	12/52	t	++	2.3	d+ya100	0	0
3348	<i>Dioscorea</i> sp.	Cruz, El Progreso, Guat.	1/53	t	++	0.3	d100	0	0
3354	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3355	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3356	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3357	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3358	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3359	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3360	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3361	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3362	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3363	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3364	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3365	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3366	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3367	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3368	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3369	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3370	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3371	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..
3372	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0.8 mi	d100	0	0
3373	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0.5 mi	d100	0	0
3374	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53	t	++	0	..	..	..

## DIOSCOREACEAE

3375	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53 t	0	.....
3376	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53 t	0	.....
3377	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53 t	0	.....
3378	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53 t	0	.....
3379	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53 t	0	.....
3380	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53 t	0	.....
3381	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53 t	0	.....
3382	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53 t	0	.....
3383	<i>Dioscorea</i> sp.	Mayaguez, P. R.	1/53 t	0	.....
3386	<i>Dioscorea</i> sp.	Sebol, Alta Verapaz, Guat.	2/53 r	1.0	d100
3388	<i>Dioscorea</i> sp.	Panzos, Alta Verapaz, Guat.	2/53 r	1.0	d100
3391	<i>Dioscorea</i> sp.	Panzos, Alta Verapaz, Guat.	2/53 r	2.3	d100
3393	<i>Dioscorea</i> sp.	Panzos, Alta Verapaz, Guat.	2/53 r	0.3 mi	nss
3394	<i>Dioscorea</i> sp.	Panzos, Alta Verapaz, Guat.	2/53 r	0	.....
3405	<i>Dioscorea</i> sp.	W. of San Pedro Sula, Hond.	3/53 r	0	.....
3406	<i>Dioscorea</i> sp.	Cofradia, Cortes, Hond.	3/53 r	0	.....
3407	<i>Dioscorea</i> sp.	Lancetilla Sta., Atlantida, Hond.	3/53 r	0	.....
3408	<i>Dioscorea</i> sp.	Lancetilla Sta., Atlantida, Hond.	3/53 r	+	0
3409	<i>Dioscorea</i> sp.	Lancetilla Sta., Atlantida, Hond.	3/53 r	+	0.3 d100
3410	<i>Dioscorea</i> sp.	Lancetilla Sta., Atlantida, Hond.	3/53 t	+	0
3411	<i>Dioscorea</i> sp.	W. of La Ceiba, Atlantida, Hond.	3/53 r	+	0.5 d100
3412	<i>Dioscorea</i> sp.	S. of La Ceiba, Atlantida, Hond.	3/53 r	+	0.5 d100
3413	<i>Dioscorea</i> sp.	S. of La Ceiba, Atlantida, Hond.	3/53 r	+	0.2 d100
3414	<i>Dioscorea</i> sp.	S. W. of La Ceiba, Atlantida, Hond.	3/53 r	+	0.15 d100
3417	<i>Dioscorea</i> sp.	Lancetilla Sta., Atlantida, Hond.	3/53 t	+	0
3418	<i>Dioscorea</i> sp.	E. of Choluteca, Hond.	3/53 r	+	0
3420	<i>Dioscorea</i> sp.	Tablones, Choluteca, Hond.	3/53 r	+	1.0 d100
3421	<i>Dioscorea</i> sp.	Perspire, Choluteca, Hond.	3/53 r	+	3.2 d100
3422	<i>Dioscorea</i> sp.	Perspire, Choluteca, Hond.	3/53 r	0	.....
3423	<i>Dioscorea</i> sp.	Pta. Libertad, El Salv.	3/53 t	0	.....
3428	<i>Dioscorea</i> sp.	Pta. Libertad, El Salv.	3/53 t	0	.....
3429	<i>Dioscorea</i> sp.	Sta. Cruz Porrillo, El Salv.	3/53 r	3.5	ya75; d25
3430	<i>Dioscorea</i> sp.	Sta. Cruz Porrillo, El Salv.	3/53 r	1.35	d+ya100
3431	<i>Dioscorea</i> sp.	Sta. Cruz Porrillo, El Salv.	3/53 r	0	.....
3432	<i>Dioscorea</i> sp.	Sta. Cruz Porrillo, El Salv.	3/53 r	0	.....
3433	<i>Dioscorea</i> sp.	S. of San Salvador, El Salv.	3/53 r	0	.....
3434	<i>Dioscorea</i> sp.	Pedro Miguel, Canal Zone	3/53 t	0	.....
3439	<i>Dioscorea</i> sp.	Pedro Miguel, Canal Zone	3/53 t	0	.....
3440	<i>Dioscorea</i> sp.	Pedro Miguel, Canal Zone	3/53 t	0	.....

Accession No.	Species	Source	Date Collected	DISCOREACEAE		Hemolysis Test M.F.B. %	Saponins Identified, % of Total	Flavonoids	Alkaloids	Tannins	Sterols
				Plant Part	Date Collected						
3441	<i>Dioscorea</i> sp.	Pedro Miguel, Canal Zone	3/53	r	0	....	....	....	....	....	....
3446	<i>Dioscorea</i> sp.	G. D. M.	3/53	t	0	....	....	....	....	....	....
3447	<i>Dioscorea</i> sp. ( <i>cult.</i> )	Baton Rouge, La.	3/53	t	0	....	....	....	....	....	....
3448	<i>Dioscorea</i> sp. ( <i>cult.</i> )	Baton Rouge, La.	3/53	t	0	....	....	....	....	....	....
3449	<i>Dioscorea</i> sp. ( <i>cult.</i> )	Cuyotenango, Guat.	3/53	t	0	....	....	....	....	....	....
3451	<i>Dioscorea</i> sp. ( <i>cult.</i> )	Cuyotenango, Guat.	3/53	t	0	....	....	....	....	....	....
3452	<i>Dioscorea</i> sp. ( <i>cult.</i> )	San Sebastian, Retal, Guat.	3/53	r	0.9	d45; ya45	....	....	....	....	....
3455	<i>Dioscorea</i> sp.	San Rafael Panan, Guat.	3/53	r	3.0	d75; ya25	....	....	....	....	....
3456	<i>Dioscorea</i> sp.	Tepic-Mazatlan, Nay., Mex.	4/53	r	3.7	d100	....	....	....	....	....
3468	<i>Dioscorea</i> sp.	W. of Talcocotan, Nay., Mex.	4/53	r	2.5	d100	....	....	....	....	....
3469	<i>Dioscorea</i> sp.	Turtepec, Oax., Mex.	5/53	t	3.0	d100	....	....	....	....	....
3481	<i>Dioscorea</i> sp.	La Tinaia and Tierra Blanca,	5/53	r	2.4	d+ya100	....	....	....	....	....
3484	<i>Dioscorea</i> sp.	Ver., Mex.	5/53	r	1.7	ya80; d20	....	....	....	....	....
3489	<i>Dioscorea</i> sp.	Jalapa, Ver., Mex.	5/53	r	3.8	d100	....	....	....	....	....
3503	<i>Dioscorea</i> sp.	Tihuatlan, Ver., Mex.	5/53	r	2.1	d100	....	....	....	....	....
3510	<i>Dioscorea</i> sp.	Turiabba, C.R.	5/53	t	0.3	ni	....	....	....	....	....
3511	<i>Dioscorea</i> sp.	E. End St. Croix, Virgin Islands	6/53	t	0	....	....	....	....	....	....
3520	<i>Dioscorea</i> sp.	G. D. M.	4/53	t	0	....	....	....	....	....	....
3521	<i>Dioscorea</i> sp.	G. D. M.	4/53	t	0	....	....	....	....	....	....
3525	<i>Dioscorea</i> sp.	Pedro Miguel, Canal Zone	6/53	t	0	....	....	....	....	....	....
3532	<i>Dioscorea</i> sp.	Savannah, Ga.	9/53	t	0	....	....	....	....	....	....
3535	<i>Dioscorea</i> sp.	Valparaiso, Chile	11/53	t	0	....	....	....	....	....	....
3536	<i>Dioscorea</i> sp.	Nat. Bot. Gard., Valparaiso, Chile	11/53	t	0	....	....	....	....	....	....
3537	<i>Dioscorea</i> sp.	Nat. Bot. Gard., Valparaiso, Chile	11/53	t	+	0	....	....	....	....	....
3538	<i>Dioscorea</i> sp.	Nat. Bot. Gard., Valparaiso, Chile	11/53	t	+	0	....	....	....	....	....
3539	<i>Dioscorea</i> sp.	Nat. Bot. Gard., Valparaiso, Chile	11/53	t	+	0	....	....	....	....	....
3540	<i>Dioscorea</i> sp.	Nat. Bot. Gard., Valparaiso, Chile	11/53	t	+	0	....	....	....	....	....
3541	<i>Dioscorea</i> sp.	Nat. Bot. Gard., Valparaiso, Chile	11/53	t	+	0	....	....	....	....	....
3542	<i>Dioscorea</i> sp.	S. of Ovalle, Coquimbo, Chile	11/53	t	0	....	....	....	....	....	....
3543	<i>Dioscorea</i> sp.	S. of Ovalle, Coquimbo, Chile	11/53	t	0	....	....	....	....	....	....
3544	<i>Dioscorea</i> sp.	Gutierrez, Coquimbo, Chile	11/53	t	0	....	....	....	....	....	....
3547	<i>Dioscorea</i> sp.	Savannah, Ga.	10/53	l, s	0	....	....	....	....	....	....
3549	<i>Dioscorea</i> sp.	Savannah, Ga.	10/53	l, s	0	....	....	....	....	....	....
3550	<i>Dioscorea</i> sp.	Savannah, Ga.	10/53	l, s	0	....	....	....	....	....	....
3551	<i>Dioscorea</i> sp.	Savannah, Ga.	10/53	l, s	0	....	....	....	....	....	....
3552	<i>Dioscorea</i> sp.	Savannah, Ga.	10/53	l, s	0	....	....	....	....	....	....
3553	<i>Dioscorea</i> sp. ( <i>cult.</i> )	Brooksville, Fla.	11/53	r	0.6 mi	d100	....	....	....	....	....
3564	<i>Dioscorea</i> sp. ( <i>cult.</i> )	Brooksville, Md.	12/53	s	...	...	....	....	....	....	....



Accession No.	Species	Source	Collection		Date Collected	Plant Part	Hemolysis Test	Saponins M.F.B., %	Total, Identified, % of Total	Flavonoids	Alkaloids	Tannins	Sterols
			DIOSCOREACEAE	ELAEAGNACEAE									
3758	<i>Dioscorea</i> sp.	G. D. M.	4/54 t	-	...	...	...	...	...	...	...	...	...
3759	<i>Dioscorea</i> sp.	G. D. M.	4/54 t	-	+	0.9 mi d100	-	...	...	...	...	...	...
3760	<i>Dioscorea</i> sp.	G. D. M.	4/54 t	-	-	0	-	...	...	...	...	...	...
3761	<i>Dioscorea</i> sp.	G. D. M.	4/54 t	-	-	0	-	...	...	...	...	...	...
3820	<i>Dioscorea</i> sp.	E. of Huanuco, Peru	4/54 rh	-	-	0	-	...	...	...	...	...	...
3821	<i>Dioscorea</i> sp.	E. of Carpish Pass, Peru	4/54 rh	-	-	0	-	...	...	...	...	...	...
3822	<i>Dioscorea</i> sp.	E. of Carpish Pass, Peru	4/54 rh	-	-	0	-	...	...	...	...	...	...
3824	<i>Dioscorea</i> sp.	Tingo Maria, Peru	4/54 rh	-	-	0	-	...	...	...	...	...	...
3825	<i>Dioscorea</i> sp.	Tingo Maria, Peru	4/54 rh	-	-	0	-	...	...	...	...	...	...
3826	<i>Dioscorea</i> sp.	W. of Carmen Alto, Tingo Maria, Peru	4/54 rh	-	-	0	-	...	...	...	...	...	...
3880	<i>Dioscorea</i> sp.	Tingo Maria, Peru	4/54 l, s	+	0	...	-	0	0	0	+	0	0
3886	<i>Eleagnus umbellatus</i>	Clarke Co., Ga.	4/54 l, tw	-	...	...	-	0	0	0	+	+	+
3557	<i>Arctostaphylos pungens</i>	Chico, Cal.	11/53 l, tw	-	-	0	-	0	0	+	+	+	+
3558	<i>Arctostaphylos pungens</i>	Chico, Cal.	11/53 fr	-	-	0	-	0	0	+	+	+	+
3559	<i>Arctostaphylos pungens</i>	Chico, Cal.	11/53 wd	-	-	0	-	0	0	+	+	+	+
3708	<i>Desmodium lucidus</i>	Wayne Co., Ga.	3/54 l, tw	-	-	0	-	0	0	+	+	+	+
3732	<i>Leucotrichia axillaris</i>	Southport, Brunswick Co., N. C.	4/54 l, tw	-	-	0	-	0	0	+	+	+	+
3710	<i>Lyonia fruticosa</i>	Wayne Co., Ga.	3/54 l, tw	-	-	0	-	0	0	+	+	+	+
3592	<i>Lyonia lucida</i>	Southport, Brunswick Co., N. C.	2/54 l, s	-	-	0	-	0	0	+	+	+	+
3631	<i>Perennia poeppigii</i>	La Paz, Bolivia	3/54 l	-	-	0	-	0	0	+	+	+	+
3798	<i>Polycondium floridanum</i>	McIntosh Co., Ga.	4/54 l	-	-	0	-	0	0	+	+	+	+
3799	<i>Vaccinium arboreum</i>	Long Co., Ga.	4/54 l	-	-	0	-	0	0	+	+	+	+
3849	<i>Acatyppha</i> sp.	Cava de la Lechuza, Tingo Maria, Peru	4/54 l, tw	-	-	0	-	0	0	+	+	+	+
3950	<i>Acatyppha</i> sp.	Tingo Maria, Peru	4/54 l, s	-	-	0	-	0	0	+	+	+	+
3657	<i>Alchoria cordifolia</i>	C. G. F. McIntosh Co., Ga.	9/52 l	-	-	0	-	0	0	+	+	+	+
3784	<i>Croton punctatus</i>	Tingo Maria, Peru	4/54 l, s	-	-	0	-	0	0	+	+	+	+
3851	<i>Euphorbia</i> sp.	Cochabamba, Bolivia	4/54 l, tw	-	-	0	-	0	0	0	0	0	0
3619	<i>Hura crepitans</i>	Tingo Maria, Peru	2/54 b	-	-	0	-	0	0	+	+	+	+
3949	<i>Jatropha</i> sp.	Tingo Maria, Peru	4/54 l	-	-	0	-	0	0	0	0	0	0
3002	<i>Sapindus sebiferum</i>	C. G. F.	8/52 l	-	-	0	-	0	0	+	+	+	+
3797	<i>Quercus cinerea</i>	Long Co., Ga.	4/54 l, s	-	-	0	-	0	0	+	+	+	+
3915	<i>Quercus laevigata</i>	Southport, Brunswick Co., N. C.	4/54 l, s	-	-	0	-	0	0	+	+	+	+
3930	<i>Quercus nigra</i>	Oglethorpe Co., Ga.	4/54 l, s	-	-	0	-	0	0	+	+	+	+

Accession No.	Species	Collection	Hemolysis Test		Saponins Total	Identified % of Total	Flavonoids	Tannins	Sterols
			Date Collected	Plant Part					
<b>GERANIACEAE</b>									
3643	<i>Erodium cicutarium</i>	Clarke Co., Ga.	3/54	1	-	-	0	0	++
3689	<i>Erodium cicutarium</i>	Raleigh, N. C.	3/54	w	-	-	0	0	++
3819-0	<i>Erodium</i> sp.	Greece (P. Manos)	3/54	1	-	-	0	0	++
3686	<i>Geranium carolinianum</i>	Raleigh, N. C.	3/54	1	-	-	0	0	++
3770	<i>Geranium carolinianum</i>	Bullock Co., Ga.	4/54	1, s	-	-	0	0	++
3546	<i>Ephedra trifurca</i>	H. M. Woodman, Truth or Consequence, N. Mex.	10/53	wd, 1, s	+	0	0	0	0
<b>GRAMINEAE</b>									
3842	<i>Anthoxanthum odoratum</i>	Raleigh, N. C.	4/54	w	-	-	0	0	++
3936	<i>Bromus catharticus</i>	Clarke Co., Ga.	4/54	1, s	-	-	0	0	++
3655	<i>Neyraudia madagascariensis</i>	C. G. F.	3/54	1, s	-	-	0	0	++
3787	<i>Sipa avenacea</i>	McIntosh Co., Ga.	4/54	1, s	-	-	0	0	++
3653	<i>Themeda gigantea</i> var. <i>vulpina</i>	C. G. F.	3/54	1, s	-	-	0	0	++
3656	<i>Tribecacum lacuum</i>	C. G. F.	3/54	1, s	-	-	0	0	++
3651	<i>Zoysia japonica</i> var. <i>pungens</i>	C. G. F.	3/54	1	-	-	0	0	++
<b>GUTTIFERAE</b>									
3598	<i>Garcinia dulcis</i> (cult.)	Atkins Gard., Soledad, Cuba	2/54	1	-	-	0	+	+
3894	<i>Vismia</i> sp.	Tingo Maria, Peru	4/54	1, tw, b	-	-	0	+	+
3796	<i>Liquidambar styraciflua</i>	McIntosh Co., Ga.	4/54	1, s	-	-	0	+	+
<b>HAMAMELIDACEAE</b>									
3777	<i>Aesculus parva</i>	Greene Co., Ga.	4/54	1, s, r	-	-	0	+	+
3734	<i>Aesculus parva</i>	Raleigh, N. C.	4/54	1, tw	+	-	0	+	+
3679	<i>Aesculus syriatica</i>	Raleigh, N. C.	3/54	1, tw	-	-	0	+	+
3012	<i>Pterocarya stenoptera</i>	C. G. F.	8/52	1	-	-	0	+	+
3144	<i>Juliania adstringens</i>	Camarón, Oax., Mex.	9/52	b	+	-	0	0	++
3218	<i>Juliania glauca</i>	N. W. of Apatzingán, Michoacán, Mex.	10/52	b	+	-	0	0	++
<b>LABIATAE</b>									
3642	<i>Lamium amplexicaule</i>	Clarke Co., Ga.	3/54	1	-	-	0	0	++
3687	<i>Lamium amplexicaule</i>	Raleigh, N. C.	3/54	w	-	-	0	0	++
3645	<i>Lamium purpureum</i>	Clarke Co., Ga.	3/54	1	-	-	0	0	++
3779	<i>Sabicea lyrate</i>	McIntosh Co., Ga.	4/54	1, s	-	-	0	0	++
3947	<i>Scutellaria speciosa</i>	W. of Tingo María, Peru	4/54	1, s	-	-	0	0	++
3789	<i>Cinnamomum camphora</i>	McIntosh Co., Ga.	4/54	1	-	-	0	0	++
3615	<i>Persea borbonia</i>	Southport, Brunswick Co., N. C.	2/54	1	-	-	0	0	++



Accession No.	Species	Date Collected	Plant Part	Hemolysis Test		Saponins Total M.F.B. %	Identified % of Total	Flavonoids	Alkaloids	Tannins	Sterols
				M.F.B.	%						
<b>LILIACEAE</b>											
3121-O	<i>Aloe vera</i>	10/52	Dried juice	+	0.8 mi	.....	0	0	0	0	0
3017	<i>Aethericum sp.</i>	8/52	w	+	0	.....	0	0	0	0	0
3213	<i>Aethodeline sp.</i>	10/52	t	+	0	.....	0	0	0	0	+
3197	<i>Beaucarnea inermis</i>	10/52	s	-	0	.....	0	0	0	0	+
3337	<i>Eucornis undulata</i>	1/53	r, bu, l	+	0	.....	0	0	0	0	+
3712	<i>Liriope spicata</i>	3/54	l	-	0	.....	0	0	0	0	+
3335	<i>Ornithogalum sp.</i>	12/52	r, bu, l	+	0	.....	0	0	0	0	+
3336	<i>Ornithogalum sp.</i>	12/52	r, bu, l	+	0	.....	0	0	0	0	+
3453	<i>Smilax sp.</i>	12/52	r, bu, l	+	0	.....	0	0	0	0	+
3416	<i>Smilax sp.</i>	3/53	r	-	0	.....	0	0	0	0	+
3401	<i>Urginea burkei</i>	3/53	r	.....	0	.....	0	0	0	0	+
3886A	<i>Yucca filamentosa</i>	2/53	bu	-	0.3	k100	0	0	0	0	+
3886B	<i>Yucca filamentosa</i>	N.C.	1	+	0.3	.....	0	0	0	0	+
3827	<i>Yucca gloriosa</i>	2/54	r	+	0	.....	0	0	0	0	+
3828	<i>Yucca gloriosa</i>	7/53	1	+	0	.....	0	0	0	0	+
3265	<i>Yucca peninsulae</i>	Sierra San Miguel, B. C., Mex.	12/52	1, dead	+	2.5 ir.	t; h	.....	.....	.....	.....
3274	<i>Yucca peninsulae</i>	Laguna Jaragua, B. C., Mex.	12/52	1	+	1.0 ir.	t	.....	.....	.....	.....
3280	<i>Yucca peninsulae</i>	Sierra San Miguel, B. C., Mex.	12/52	1, dead	+	1.1 ir.	t; g, h	.....	.....	.....	.....
3332	<i>Yucca peninsulae</i>	San Miguel, B. C., Mex.	12/52	1	+	0.3 ir.	t; h, g	.....	.....	.....	.....
3515	<i>Yucca peninsulae</i>	N. of San Fernando, B. C., Mex.	5/53	1	+	1.3	t80, g20	.....	.....	.....	.....
3516	<i>Yucca peninsulae</i>	N. of San Fernando, B. C., Mex.	5/53	1	+	1.4 ir.	t; g	.....	.....	.....	.....
3305	<i>Yucca schidigera</i>	N. of San Fernando, B. C., Mex.	12/52	1	+	0.9 ir.	ss, rk	.....	.....	.....	.....
3244	<i>Yucca schidigera</i>	Aguanga, Cal.	12/52	1	+	1.3	ss100	.....	.....	.....	.....
3223-O	<i>Yucca schidigera</i>	Kingman, Ariz.	11/52	Juice	+	83 mg./gal.	ss100	.....	.....	.....	.....
3480	<i>Yucca schidigera</i>	Kingman, Ariz.	4/53	1	+	3.6 ir.	ss	.....	.....	.....	.....
3224	<i>Yucca whipplei</i>	Murrieta, Cal.	11/52	1, dead	+	1.1	t80, g20	.....	.....	.....	.....
3225	<i>Yucca whipplei</i>	Murrieta, Cal.	11/52	1, green	+	0.9	t100	.....	.....	.....	.....
3399	<i>Yucca whipplei</i>	Calif.	2/53	1	+	1.0 ir.	t	.....	.....	.....	.....
3253	<i>Yucca sp.</i>	B. C., Mex.	12/52	1	+	0.9	t100	.....	.....	.....	.....
3395	<i>Yucca sp.</i>	Kingman, Ariz.	2/53	1	+	0.9	.....	.....	.....	.....	.....
3497	<i>Yucca sp.</i>	Djakarta, Indonesia	5/53	1, juice	+	0	.....	.....	.....	.....	.....
3498	<i>Yucca sp.</i>	Djakarta, Indonesia	5/53	1, juice	+	0.2 mi	.....	.....	.....	.....	.....
3582	<i>Linum usitatissimum</i>	Corvallis, Ore.	2/54	Straw	+	0	.....	.....	.....	.....	.....
3583	<i>Linum usitatissimum</i>	Corvallis, Ore.	2/54	s.d	+	0	0	0	0	0	+

Accession No.	Species	Collect. Source	Date Collected	Plant Part	Hemolysis Test	Saponins Total, M.F.B., %	Identified, % of Total	Flavonoids	Alkaloids	Tannins	Sterols
3900	<i>Lassa sp.</i>	Quilca, Lima, Peru	4/54	l, s	-	....	....	0	0	0	+
3587	<i>Gesnerium sempervirens</i>	Southport, Brunswick Co., N.C.	2/54	l, s	-	....	....	++	0	0	++
3899	<i>Heimia sp.</i>	Rio Chincha, Tingo Maria, Peru	4/54	l, s, b	-	....	....	0	0	++	+
3593	<i>Magnolia virginiana</i>	Southport, Brunswick Co., N.C.	2/54	l, s	-	....	....	++	0	0	++
3214	<i>Macagnia macroptera</i>	San Bernardo, Son., Mex. G.D.M.	10/52	b	+	....	....	0	0	++	++
3444	<i>Sigmaphyllum humboldtianum</i>		3/53	r, t	-	....	....	0	0	0	0
3445	<i>Sigmaphyllum humboldtianum</i>		3/53	r, t	-	....	....	0	0	0	0
3203	<i>Sigmaphyllum seierianum</i>	Balsa Larga, Ver., Mex. Martinez de la Torre, Ver., Mex.	10/52	r	+	0	0	0	0	0	0
3502	<i>Sigmaphyllum sp.</i>		5/53	r	+	0	0	0	0	0	0
3780	<i>Modiola caroliniana</i>	McIntosh Co., Ga.	4/54	l, s	+	....	....	0	0	0	++
3845	<i>Sida sp.</i>	Tingo Maria, Peru	4/54	l, tw	-	....	....	0	0	0	++
3885	<i>Sida sp.</i>	Tingo Maria, Peru	4/54	l, s	-	....	....	0	0	0	++
3850	<i>Blakea mexiae</i>	Puerto Prado, Tingo Maria, Peru	4/54	l, tw, b	-	....	....	0	0	0	++
3977	<i>Cleidemia dentata</i>	E. of Tingo Maria, Peru	4/54	l, s	-	....	....	0	0	0	++
3970	<i>Leandra dichotoma</i>	Monzon Rd., Tingo Maria, Peru	4/54	l, s	-	....	....	0	0	0	++
3882	<i>Loreya mespiloides</i>	E. of Tingo Maria, Peru	4/54	l, tw, b	-	....	....	0	0	0	++
3855	<i>Miconia sp.</i>	E. of Tingo Maria, Peru	4/54	l, s	-	....	....	0	0	0	++
3864	<i>Miconia sp.</i>	W. of Tingo Maria, Peru	4/54	l, s, b	-	....	....	0	0	0	++
3892	<i>Miconia sp.</i>	Bet. Divisoria and Carmen Alto, Tingo Maria, Peru	4/54	l, s	-	....	....	0	0	0	++
3893	<i>Miconia sp.</i>	Bet. Divisoria and Carmen Alto, Tingo Maria, Peru	4/54	l, s	-	....	....	0	0	0	++
3108	<i>Stephania cephalanthera</i>	G. D. M.	9/52	l, s, t	-	....	....	0	+	0	+
3988A	<i>Brosimum sp.</i>	Monzon Rd., Tingo Maria, Peru	4/54	l, s	-	....	....	0	0	0	++

		MORACEAE	
		Monzon Rd., Tingo Maria, Peru	
3068B	<i>Brosimum</i> sp.		
3086	<i>Broussonetia papyrifera</i>	9/52	1
3670A	<i>Ficus altissima</i>	3/54	1, s, r
3670B	<i>Ficus altissima</i>	3/54	fr
3685	<i>Ficus acheri</i>	2/54	s
3613A	<i>Ficus asperifolia</i>	2/54	1, s
3613B	<i>Ficus asperifolia</i>	2/54	fr
3696	<i>Ficus benghalensis</i>	2/54	1, s, r
3680	<i>Ficus benghalensis</i>	3/54	1, s, fr
3681	<i>Ficus benghalensis</i>	3/54	1, s
3607	<i>Ficus benghalensis</i>	3/54	1, s
3696	<i>Ficus caffra</i>	3/54	1, s, r
3696	<i>Ficus caudatijolia</i>	3/54	1, s
3695	<i>Ficus columnaris</i>	3/54	1, s
3674A	<i>Ficus dumosa</i>	3/54	1, s, r
3674B	<i>Ficus dumosa</i>	3/54	fr
3839	<i>Ficus durenii</i>	4/54	1, tw
3700	<i>Ficus elastica</i>	3/54	1, s, fr, r
3702	<i>Ficus erioobalroides</i>	3/54	1, s, fr, r
3621A	<i>Ficus eugeniooides</i>	3/54	1, s, r
3621B	<i>Ficus eugeniooides</i>	3/54	fr
3608	<i>Ficus gibbosa</i>	2/54	s
3697	<i>Ficus glomerata</i>	3/54	1, s
3672	<i>Ficus gynaethorpha</i>	3/54	1, s, r
3623	<i>Ficus henneana</i>	3/54	1, s
3814	<i>Ficus hookeri</i>	4/54	1, tw, r
3614	<i>Ficus jacquintifolia</i>	2/54	1, s, r
3610	<i>Ficus krishnae</i>	2/54	1, s
3662	<i>Ficus lacor</i>	3/54	1, s, r
3609	<i>Ficus laevigata</i>	2/54	1, s
3337	<i>Ficus macrophylla</i>	4/54	1, tw
3816	<i>Ficus mariannensis</i>	4/54	1, tw, f, r
3699	<i>Ficus minahassae</i>	3/54	1, s
3693	<i>Ficus mitrophora</i>	3/54	1, s, r
3625	<i>Ficus myorensis</i>	3/54	1, s, r
3701	<i>Ficus niida</i>	3/54	1, s, fr, r
3663	<i>Ficus note</i>	3/54	1, s
3627	<i>Ficus odorata</i>	3/54	s
3624	<i>Ficus padifolia</i>	4/54	1, s
3815	<i>Ficus padifolia</i>	4/54	1, tw, r
3667	<i>Ficus palmata</i>	3/54	1, s
3664	<i>Ficus pandurata</i>	3/54	1, s
3612	<i>Ficus platyphilla</i>	2/54	1, s, r
3668A	<i>Ficus platyphilla</i> var. <i>petiolaris</i>	3/54	1, s, r
3668B	<i>Ficus platyphilla</i> var. <i>petiolaris</i>	3/54	fr
3671A	<i>Ficus pretoriae</i>	3/54	1, s
3671B	<i>Ficus pretoriae</i>	3/54	fr

Accession No.	Species	Source	Collection	Date Collected	Plant Part	Hemolysis Test		Saponins Total, M. F. B., %	Saponins Identified, % of Total	Flavonoids	Alkaloids	Tannins	Sterols
						MORACEAE	MYRTACEAE	MUSACEAE	MYRTACEAE				
3698	<i>Ficus pumila</i>	C. G. F.		3/54	I, s	-	-	-	-	0	0	0	0
3665	<i>Ficus religiosa</i>	C. G. F.		3/54	I, s	-	-	-	-	0	0	0	0
3703	<i>Ficus rigo</i>	C. G. F.		3/54	I, s, fr	-	-	-	-	0	0	0	0
3622	<i>Ficus roxburghii</i>	C. G. F.		3/54	I, s, r	-	-	-	-	0	0	0	0
3611A	<i>Ficus rubiginosa</i>	C. G. F.		2/54	I, s	-	-	-	-	0	0	0	0
3611B	<i>Ficus rubiginosa</i>	C. G. F.		2/54	fr	-	-	-	-	0	0	0	0
3620	<i>Ficus salicifolia</i>	C. G. F.		3/54	I, s, r	-	-	-	-	0	0	0	0
3669	<i>Ficus sycomorus</i>	C. G. F.		3/54	I, s, r	-	-	-	-	0	0	0	0
3704	<i>Ficus tinctoria</i>	C. G. F.		3/54	I, s, fr, r	-	-	-	-	0	0	0	0
3694	<i>Ficus ulmifolia</i>	C. G. F.		3/54	I, s, fr	-	-	-	-	0	0	0	0
3666	<i>Ficus vogelii</i>	C. G. F.		3/54	I, s, fr	-	-	-	-	0	0	0	0
3818	<i>Ficus volkensii</i>	C. G. F.		4/54	I, tw	-	-	-	-	0	0	0	0
3628A	<i>Ficus walkeri</i>	C. G. F.		3/54	I, s	-	-	-	-	0	0	0	0
3628B	<i>Ficus walkeri</i>	C. G. F.		3/54	fr	-	-	-	-	0	0	0	0
3628C	<i>Ficus walkeri</i>	C. G. F.		3/54	r	-	-	-	-	0	0	0	0
3982	<i>Ficus sp.</i>	Tingo Maria, Peru		4/54	I, tw, b	-	-	-	-	0	0	0	0
3320	<i>Ficus sp.</i>	Mexico City, Mex.		12/52	latex	-	-	-	-	0	0	0	0
3321	<i>Ficus sp.</i>	Mexico City, Mex.		12/52	latex	-	-	-	-	0	0	0	0
3992	<i>Heliconia tenera</i>	Tingo Maria, Peru		4/54	I, s	-	-	-	-	0	0	0	0
3588	<i>Myrica cerifera</i>	Southport, Brunswick Co., N. C.		2/54	I, s	-	-	-	-	0	0	0	0
3707	<i>Myrica cerifera</i>	Wayne Co., Ga.		3/54	I	-	-	-	-	0	0	0	0
3638	<i>Myrica rubra</i> (cult.)	Atkins Gard., Soledad, Cuba		3/54	I, s	-	-	-	-	0	0	0	0
3058	<i>Eucalyptus alba</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3063	<i>Eucalyptus camaldulensis</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3088	<i>Eucalyptus citriodora</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3091	<i>Eucalyptus crebra</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3094	<i>Eucalyptus crebra</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3093	<i>Eucalyptus exserta</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3574	<i>Eucalyptus globulus</i>	Arboretum, Arcadia, Cal.		12/53	s, d	-	-	-	-	0	0	0	0
3085	<i>Eucalyptus hemisphaerica</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3065	<i>Eucalyptus kirkiana</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3060	<i>Eucalyptus longifolia</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3086	<i>Eucalyptus obliqua</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3084	<i>Eucalyptus ovata</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3062	<i>Eucalyptus paniculata</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3087	<i>Eucalyptus pauciflora</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3089	<i>Eucalyptus paupertana</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0
3092	<i>Eucalyptus polyanthemos</i>	C. G. F.		9/52	I, fr	-	-	-	-	0	0	0	0



Accession No.	Species	Source	Date Collected	Plant Part	Hemolysis Test			Saponinoids		Alkaloids	Tannins	Sterols
					M.	F.	B.	Total Identified	% of Total			
3733	<i>Corydalis micrantha</i>	Raleigh, N. C.	4/54	w	-	...	...	0	+	0	0	+++
3517	<i>Limeum aethiopicum</i>	G. D. M. Monzon Rd., Tingo Maria, Peru	6/53	t	+ 0	0	0	0	0	0	0	+
3969	<i>Phytolacca</i> sp.		4/54	l, s, sd	+ 0	0	0	0	0	0	0	+
3276	<i>Stegnosperma halimifolium</i>	Santa Rosalia, B. C., Mex.	12/52	1	-	...	...	0	+	0	0	+
3840A	<i>Cupressus funebris</i> (cult.)	Atkins Gard., Soledad, Cuba	3/54	l, s	-	...	...	0	+	0	0	+
3840B	<i>Cupressus funebris</i> (cult.)	Atkins Gard., Soledad, Cuba	3/54	b	-	...	...	0	++	0	0	++
3677	<i>Juniperus virginiana</i>	Raleigh, N. C.	3/54	l, tw	-	...	...	0	+	0	0	++
3591	<i>Pinus palustris</i>	Southport, Brunswick Co., N. C.	2/54	1	-	...	...	0	+	0	0	++
3678	<i>Pinus taeda</i>	Raleigh, N. C.	3/54	l, tw	-	...	...	+	0	+	+	++
3988	<i>Piper</i> sp.	E. of Tingo Maria, Peru	4/54	l, s	-	...	...	0	0	0	0	+++
3963	<i>Piper</i> sp.	Rio Monzon, Tingo Maria, Peru	4/54	l, s, b	-	...	...	0	0	0	0	+++
3723	<i>Pittosporum tobira</i>	Raleigh, N. C.	4/54	l, tw	-	...	...	+	0	0	0	++
3684	<i>Plantago lanceolata</i>	Raleigh, N. C.	3/54	w	-	...	...	0	0	0	0	++
3764	<i>Plantago lanceolata</i>	Oglethorpe Co., Ga.	4/54	1	-	...	...	0	0	0	0	++
3625	<i>Polygonum cuspidatum</i>	Athens, Ga.	4/54	l, s, r	-	...	...	0	0	0	0	++
3641	<i>Rumex crispus</i>	Athens, Ga.	3/54	l, s	-	...	...	0	0	0	0	++
3767	<i>Rumex hastatulus</i>	Oglethorpe Co., Ga.	4/54	l, s	-	...	...	0	0	0	0	++
3682	<i>Rumex obtusifolius</i>	Raleigh, N. C.	3/54	l, r	-	...	...	0	0	0	0	++
3794	<i>Asplenium platyneuron</i>	McIntosh Co., Ga.	4/54	1	-	...	...	0	0	0	0	++
3793	<i>Dryopteris normalis</i>	McIntosh Co., Ga.	4/54	1	-	...	...	0	0	0	0	++
3681	<i>Polystichum acrostichoides</i>	Raleigh, N. C.	3/54	w	+ 0	0	0	+	+	0	0	++
3603	<i>Platirium aquilinum</i> var. <i>pseudocaudatum</i>	Toombs Co., Ga.	4/54	1	-	...	...	0	0	0	0	++
3714	<i>Woodwardia areolata</i>	Wayne Co., Ga.	3/54	1	-	...	...	0	0	0	0	++
3802	<i>Woodwardia virginica</i>	Toombs Co., Ga.	4/54	l, s	-	...	...	0	0	0	0	++
3830	<i>Ranunculus abortivus</i>	Raleigh, N. C.	4/54	w	-	...	...	+	0	0	0	++
3809	<i>Ranunculus abortivus</i>	Athens, Ga.	4/54	l, s	-	...	...	0	0	0	0	++
3932	<i>Ranunculus pumilus</i>	Oglethorpe Co., Ga.	4/54	l, s	-	...	...	0	0	0	0	++
3928	<i>Ranunculus recurvatus</i>											
3465	<i>Karwinskya humboldtiana</i>	San Bernardo, Son., Mex.	4/53	1	-	...	...	++	0	0	0	+

	Rubiaceae	Rosaceae	Aristolochiaceae	Rubiaceae	Rutaceae	Sapindaceae
	Mex. (J. W. Ayers)	9/52 b	9/52 b	Mex. (J. W. Ayers)	Mex. (J. W. Ayers)	Mex. (J. W. Ayers)
3006	<i>Rhizophora mangle</i>					
	<i>Amelanchier arborea</i>	Raleigh, N. C.	4/54 l, tw			
	<i>Crataegus monogyna</i>	Afyon, Turkey	10/52 sd			
	<i>Crataegus sp.</i>	Eskisehir, Turkey	10/52 sd			
	<i>Crataegus sp.</i>	Taysi Yozgat, Turkey	8/52 sd			
	<i>Crataegus sp.</i>	Malatya, Turkey	9/52 sd			
	<i>Duchesnea indica</i>	Clarke Co., Ga.	4/54 l, s, fr			
	<i>Potentilla canadensis</i>	Oglethorpe Co., Ga.	4/54 l			
	<i>Poterium sanguisorba</i>	Endicott, N. Y. (R. L. Eisworth)	9/52 w			
	<i>Prunus angustifolia</i>	Athens, Ga.	4/54 l, s			
	<i>Prunus serotina</i>	Raleigh, N. C.	4/54 l, t, w, f			
	<i>Prunus serotina</i>	Winterville, Oglethorpe Co., Ga.	4/54 l, s			
3006	<i>Calycophyllum sp.</i>	Rio Chincha, Tingo Maria, Peru	4/54 l, s, b			
	<i>Coffea arabica</i>	C. G. F.	3/54 l, s, r			
	<i>Coffea arabica</i>	Monzon Riv., Tingo Maria, Peru	3/54 fr 4/54 l, tw, b			
	<i>Condaminea corymbosa</i>	Clarke Co., Ga.	4/54 l, s			
	<i>Galium aparine</i>	Huallaga Riv., Tingo Maria, Peru	4/54 l, s			
	<i>Gonzalagenia cornifolia</i>	Huallaga Riv., Tingo Maria, Peru	4/54 b			
	<i>Hamelia patens</i>	W. of Tingo Maria, Peru	4/54 l, s			
	<i>Iseria sp.</i>	E. of Tingo Maria, Peru	4/54 l, tw, b			
	<i>Ixora acuminata (cult.)</i>	Atkins Gard., Soledad, Cuba	2/54 l			
	<i>Ixora macrothyrsa (cult.)</i>	Atkins Gard., Soledad, Cuba	2/54 l, s, f			
	<i>Portlandia dominicensis</i>	C. G. F.	9/52 l			
	<i>Psychotria brachiatia</i>	E. of Tingo Maria, Peru	4/54 l, s, b			
	<i>Psychotria sp.</i>	Tingo Maria, Peru	4/54 l, s			
3006	<i>Citrus paradisi</i> (grapefruit)	Winter Haven, Fla.	3/54 sd			
	<i>Citrus sinensis</i> (sweet orange)	Winter Haven, Fla.	3/54 sd			
	<i>Citrus reticulata</i> (tangerine)	Winter Haven, Fla.	3/54 sd			
3007	<i>Salix caroliniana</i>	Southport, Brunswick Co., N. C.	4/54 l, tw, fr			
3008	<i>Dodonaea viscosa</i>	C. G. F.	8/52 l			
	<i>Dodonaea viscosa</i>	G. D. M.	12/52 l			
	<i>Fubthoria limeana</i> (cult.)	Atkins Gard., Soledad, Cuba	3/54 l, s			

Accession No.	Species	Source	Collection Date	Plant Part	Hemolysis Test		M. F. B., %	Saponins Total, %	Saponins Identified, % of Total	Flavonoids	Alkaloids	Tannins	Sterols
					Collected	SAPOTACEAE	...	...	...	...	...	...	...
3783	<i>Bumelia tenax</i>	McIntosh Co., Ga.	4/54	1, s	+	0	...	...	0	0	0	0	++
3650A	<i>Chrysophyllum olivaeformis</i>	Ciego de Avila, Camaguey Prov., Cuba	3/54	1, s	-	0	...	...	+	0	0	0	++
3650B	<i>Chrysophyllum olivaeformis</i>	Ciego de Avila, Camaguey Prov., Cuba	3/54	b	-	...	...	...	0	0	0	0	+
3604	<i>Madhuca indica</i> (cult.)	Atkins Gard., Soledad, Cuba	2/54	1, s	-	...	...	...	+	0	0	0	++
3033	<i>Mimusops zeyheri</i>	C. G. F.	9/52	1	-	...	...	...	+	0	0	0	+
3897	<i>Calceolaria sp.</i>	Bet. Divisoria and Carmen Alto, Tingo Maria, Peru	4/54	1, s	-	...	...	...	++	0	0	0	++
3717	<i>Linaria canadensis</i>	Wayne Co., Ga.	3/54	1	-	...	...	0	0	0	0	0	++
3901	<i>Galvesia suffruticosa</i>	Quilca Lima, Peru	4/54	1, s	-	...	...	0	0	0	0	0	++
3692	<i>Verascum thapsus</i>	Raleigh, N. C.	3/54	1	-	...	...	0	0	0	0	0	+++
3938	<i>Veronica hederifolia</i>	Athens, Ga.	4/54	1, s	-	...	...	0	0	0	0	0	+++
3675	<i>Ailanthus altissima</i>	Raleigh, N. C.	3/54	tw.	-	...	...	0	0	0	0	0	++
3905	<i>Dunalia campanulata</i>	SOLANACEAE	4/54	1, s	+	0	...	0	0	0	0	0	++
3898	<i>Nicandra physalodes</i>	Bet. Divisoria and Carmen Alto, Tingo Maria, Peru	4/54	1, s	+	0	...	0	0	0	0	0	++
3548	<i>Solanum sp.</i>	Savannah, Ga.	10/53	1	-	...	...	0	0	0	0	0	++
3618	<i>Solanum sp.</i>	Todos Santos, Cochabamba, Bolivia.	2/54	r, t	-	...	...	0	0	0	0	0	0
3939	<i>Solanum sp.</i>	Exp. Sta., Tingo Maria, Peru	4/54	1, s	-	...	...	0	0	0	0	0	++
3843	<i>Solanum sp.</i>	Exp. Sta., Tingo Maria, Peru	4/54	1, s	-	...	...	0	+	0	0	0	+++
3493A	<i>Siemona sp.</i>	Djakarta, Indonesia	5/53	1 (juice)	+	0	...	0	0	0	0	0	+
3493B	<i>Siemona sp.</i>	Djakarta, Indonesia	5/53	w (juice)	+	0	...	0	0	0	0	0	+
3494	<i>Siemona sp.</i>	Djakarta, Indonesia	5/53	w (juice)	+	0	...	0	0	0	0	0	+
3772	<i>Symplocos tinctoria</i>	Emanuel Co., Ga.	4/54	1, s	+	0	...	+	0	0	0	0	++
3908	<i>Waltheria americana</i>	Guilca, Lima, Peru	4/54	1, s	-	...	...	++	0	0	0	0	++
3590	<i>Gordonia lasianthus</i>	Southport, Brunswick Co., N. C.	2/54	1, s	-	...	...	++	0	0	0	0	++
3005	<i>Holoptelea integrifolia</i>	C. G. F.	8/52	1	-	...	...	0	0	0	0	0	0
3771	<i>Chaerophyllum temulentum</i>	Bullock Co., Ga.	4/54	1	-	...	...	+	0	0	0	0	+

3808	<i>Centium maculatum</i>	Athens, Ga.	4/54 r, s	-	0	0
3804	<i>Daucus carota</i>	Athens, Ga.	4/54 1	++	0	0
3921	<i>Forniculum vulgare</i>	Southport, Brunswick Co., N. C.	4/54 v	++	0	0
3811	<i>Forniculum vulgare</i>	Athens, Ga.	4/54 l, s, r	++	0	0
3735	<i>Hydrocotyle bonariensis</i>	McIntosh Co., Ga.	4/54 1, s	++	0	+
3946	<i>Boehmeria sp.</i>	<i>URTICACEAE</i>				
3958	<i>Boehmeria sp</i>	Huallaga Riv., Tingo Maria, Peru	4/54 1, s	++	0	0
3971	<i>Boehmeria sp.</i>	Rio Monzon, Tingo Maria, Peru	4/54 1, s	++	0	0
3983	<i>Boehmeria sp.</i>	Bet. Puente Prado and Las Palmas, Tingo Maria, Peru	4/54 1, s	++	0	+
		Huallaga Riv., Tingo Maria, Peru	4/54 1, s, b	++	0	+
3973	<i>Valeriana sp.</i>	<i>VALERIANACEAE</i>				
3810	<i>Valerianella radiata</i>	Bet. Puente Prado and Las Palmas, Tingo Maria, Peru	4/54 1, s	++	0	+
		Athens, Ga.	4/54 1	++	0	+
3865A	<i>Aegiphila sp.</i>	<i>VERBENACEAE</i>				
3865B	<i>Aegiphila sp.</i>	W. of Tingo Maria, Peru	4/54 s, 1	++	0	+
3889	<i>Aegiphila sp.</i>	W. of Tingo Maria, Peru	4/54 b	++	0	+
3993	<i>Lantana sp.</i>	E. of Divisoria, Tingo Maria, Peru	4/54 1, s, b	++	0	+
		Rd. to Puerto Nuevo, Tingo Maria, Peru	4/54 1, s	++	0	+
3908	<i>Lantana sp.</i>	Quilcas, Lima, Peru	4/54 1, s	++	0	+
3773	<i>Verena canadensis</i>	Emanuel Co., Ga.	4/54 1, s	++	0	+
3800	<i>Verena tenuiseta</i>	Tatnall Co., Ga.	4/54 1, s	++	0	+
3879	<i>Verena sp.</i>	Tingo Maria, Peru	4/54 1, s	++	0	+
3037	<i>Vitea agnis-castus</i>	C. G. F.	4/62 1, s, r	++	0	+
3934	<i>Viola rafinesquii</i>	Athens, Ga.	4/54 1, s	++	0	+
3861	<i>Cissus sp.</i>	Rd. to Puerto Nuevo, Tingo Maria, Peru	4/54 1, s	++	0	+
3962	<i>Costus cylindricus</i>	Rio Manzana, Tingo Maria, Peru	4/54 1, s, b	ZINGIBERACEAE	0	0
3483	<i>Guaiacum officinale</i>	Matanzas, Cuba	5/53 1, b	ZYGOPHYLLACEAE	0	0
			0.2 mi		0	0
					+	+

<sup>a</sup> Bagasse from "heads" of agaves used for distilling mescal. <sup>b</sup> Yield may be high because of incorrect moisture

CORRECTIONS ON FIRST 1,000 ACCESSIONS (2)

Page	Acces. No.	Should Read	Page	Acces. No.	Should Read
1	909	<i>Agave collina</i>	7	739	<i>Agave mescal</i>
1	956	<i>Agave pruinosa</i>	7	936	<i>Agave pacifica</i>
1	616	<i>Agave aff. schidigera</i>	7	517	<i>Agave polyacantha</i>
3	337	<i>Agave mapisaga</i>	7	521	<i>Agave polyacantha</i>
3	331	<i>Agave cantala</i>	7	737	<i>Agave rubescens</i>
3	959	<i>Agave mescal</i>	7	910	<i>Agave schidigera</i>
3	968	<i>Agave pacifica</i>	7	515	<i>Agave striata</i>
3	259	<i>Agave vilmoriniana</i>	7	523	<i>Agave striata</i>
3	603	<i>Agave vilmoriniana</i>	7	530	<i>Agave striata</i>
3	606	<i>Agave vilmoriniana</i>	7	730	<i>Agave tequilana</i>
3	608	<i>Agave vilmoriniana</i>	7	732	<i>Agave tequilana</i>
3	610	<i>Agave vilmoriniana</i>	7	733	<i>Agave tequilana</i>
4	973	<i>Agave flexispina</i>	7	738	<i>Agave xalapensis</i>
4	977	<i>Agave flexispina</i>	8	432	<i>Agave cupreata</i>
4	963	<i>Agave patoni</i>	8	443	<i>Agave cupreata</i>
4	969	<i>Agave quiotifera</i>	8	428	<i>Agave kirchneriana</i>
6	865	<i>Agave angustifolia</i>	8	972	<i>Agave aff. scabra</i>
6	438	<i>Agave angustifolia sargentii</i>	8	985	<i>Agave aff. scabra</i>
6	860	<i>Agave collina</i>	11	929	<i>Sprekelia formosissima</i>
6	458	<i>Agave aff. crassispina</i>	12	436	<i>Bromelia pinguin</i>
6	416	<i>Agave cupreata</i>	12	456	<i>Hechtia cf. podantha</i>
6	425	<i>Agave aff. lecheguilla</i>	17	449	<i>Beaucarnea purpusii</i>
6	448	<i>Agave lecheguilla</i>	17	98	<i>Dasyliion texanum</i>
6	441	<i>Agave mapisaga</i>	17	200	<i>Dasyliion wheeleri</i>
6	853	<i>Agave marmorata</i>	18	430	<i>Dasyliion acrotriche</i>
6	453	<i>Agave mitraeformis</i>	18	439	<i>Dasyliion acrotriche</i>
6	457	<i>Agave mitraeformis</i>	18	531	<i>Dasyliion acrotriche</i>
6	937	<i>Agave pacifica</i>	18	434	<i>Dasyliion lucidum</i>
6	419	<i>Agave roezliana</i>	18	971	<i>Dasyliion wheeleri</i>
6	556	<i>Agave subsimplex</i>	18	954	<i>Nolina durangensis</i>
6	864	<i>Agave verschaffeltii</i>	18	431	<i>Nolina nelsonii</i>
6	867	<i>Agave verschaffeltii</i>	19	976	<i>Nolina juncea</i>
6	618	<i>Agave yaquiana</i>	19	961	<i>Nolina juncea</i>
7	461	<i>Agave angustifolia</i>	19	447	<i>Nolina nelsonii</i>
7	519	<i>Agave americana</i>	19	97	<i>Nolina texana</i>
7	734	<i>Agave collina</i>	19	499	<i>Ruscus hypoglossum</i>
7	731	<i>Agave aff. cupreata</i>	21	203	<i>Yucca arizonica x Y. baccata</i>
7	736	<i>Agave collina</i>	21	149	<i>Yucca arizonica x Y. baccata</i>
7	740	<i>Agave aff. cupreata</i>	21	156	<i>Yucca baccata vespertina</i>
7	907	<i>Agave aff. cupreata</i>	21	746	<i>Yucca sp.</i>
7	735	<i>Agave fenzliana</i>	22	975	<i>Yucca macrocarpa</i>
7	922	<i>Agave geminiflora</i>	23	87	<i>Yucca arkansana</i>
7	926	<i>Agave geminiflora atricha</i>	23	970	<i>Yucca rigida</i>
7	516	<i>Agave lecheguilla</i>	23	120	<i>Yucca torreyi</i>
7	529	<i>Agave lophantha</i>	24	450	<i>Yucca australis</i>
7	518	<i>Agave lophantha</i>	24	528	<i>Yucca australis</i>
7	533	<i>Agave lophantha</i>	24	525	<i>Hesperaloe funifera</i>
7	534	<i>Agave lophantha</i>	24	957	<i>Yucca decipiens</i>
7	729	<i>Agave aff. lophantha</i>	24	459	<i>Yucca periculosa</i>
24	931	<i>Yucca jaliscensis</i>	24	514	<i>Yucca sp.</i>
24	778	<i>Yucca peninsularis</i>	24	89	<i>Yucca treculeana</i>
24	773	<i>Yucca peninsularis</i>			
24	783	<i>Yucca peninsularis</i>			

CORRECTIONS ON SECOND 1,000 ACCESSIONS (4)

Page	Acces. No.	Should Read	Page	Acces. No.	Should Read
2	1269	<i>Agave mescal, var.</i>	12	1286	<i>Apodanthera palmeri</i>
2	1795	<i>Agave aff. aurea</i>	12	1336	<i>Apodanthera palmeri</i>
2	1800	<i>Agave aff. aurea</i>	12	1889	<i>Maximowiczia sonorae peninsularis</i>
2	1825	<i>Agave aurea</i>	16	1538	<i>Cnidoscolus aconitifolius</i>
4	1799	<i>Agave aff. americana</i>	16	1285	<i>Cnidoscolus augustidens</i>
4	1818	<i>Agave fourcroydes</i>	16	1290	<i>Cnidoscolus multilobus (probably)</i>
4	1796	<i>Agave roseana</i>	16	1539	<i>Cnidoscolus multilobus (probably)</i>
5	1869	<i>Agave roseana</i>	16	1103	<i>Cnidoscolus tepicensis</i>
5	1883	<i>Agave sobria</i>	16	1547	<i>Cnidoscolus tubulosus (probably)</i>
5	1046	<i>Manfreda oliverana</i>	16	1051	<i>Cnidoscolus urens</i>
6	1283	<i>Thevetia ovala</i>	16	1546	<i>Cnidoscolus urens</i>
10	1273	<i>Amoreuxia palmatifida</i>	21	1030	<i>Smilax spinosa</i>
10	1281	<i>Amoreuxia palmatifida</i>	22	1866	<i>Yucca valida, var.</i>
10	1289	<i>Amoreuxia palmatifida</i>	23	1288	<i>Martynia arenaaria</i>

On page 5, at end of *Amaryllidaceae*, add: 1096 *Polianthes geminiflora*, Autlan, Jal., Mex., 8/51, bu, +, 0.3 mi.  
 On page 12, at end of *Convolvulaceae*, add: 1013 *Ipomoea sp.*, Nay., Mex., 7/51, t, +, 0, 0, 0, 0, 0. 1017 *Ipomoea sp.*, Nay., Mex., 7/51, t, +, 0, 0, 0, 0, +.

CORRECTIONS ON THIRD 1,000 ACCESSIONS (6)

Page	Acces. no.	Should Read
1	2373	<i>Agave pruinosa</i>
3	2330	<i>Agave stricta</i>
4	2328	<i>Agave lechuguilla, var.</i>
4	2201	<i>Agave tequilana</i>
4	2101	<i>Agave yaquiana</i>
4	2102	<i>Agave yaquiana</i>
4	2205	<i>Agave yaquiana</i>
4	2206	<i>Agave yaquiana</i>
4	2207	<i>Agave yaquiana</i>
5	2337	<i>Agave filifera</i>
6	2371	<i>Agave atrovirens, var.</i>
6	2325	<i>Agave aff. cochlearis</i>
6	2156	<i>Agave rhodocantha</i>
6	2338	<i>Agave aff. victorae-Regina</i>
6	2339	<i>Agave aff. victorae-Regina</i>
20	2621	<i>Allium haematochiton</i>
21	2512	<i>Yucca arizonica</i>

TABLE II.—Contd.

Species	No. of Samples	Genin Content	
		M. F. B.	%—Min. Max.
<b>DIOSGENIN</b>			
<i>Dioscorea polygonoides</i>	1	..	0.3
<i>Dioscorea spiculiflora</i>	2	0.7	1.5
<i>Dioscorea sylvatica</i>	1	..	2.4
<i>Dioscorea tefinapensis</i>	3	0.4	0.7
<i>Dioscorea spp.</i>	55	0.4	3.7
<b>GENTROGENIN</b>			
<i>Dioscorea spiculiflora</i>	2	..	0.2
<i>Dioscorea spp.</i>	1	..	0.2
<b>GITOGENIN</b>			
<i>Agave brandegeei</i>	1	..	Tr.
<i>Agave cerulata</i>	2	..	Tr.
<i>Agave desertii</i>	1	..	Tr.
<i>Agave fourcroydes</i>	1	..	Tr.
<i>Agave mirabilis</i>	1	..	Tr.
<i>Agave mitraformis</i>	1	..	Tr.
<i>Agave promontorii</i>	1	..	Tr.
<i>Agave roseana</i>	2	..	Tr.
<i>Agave aff. schidigera</i>	1	..	Tr.
<i>Agave sobria</i>	1	..	Tr.
<i>Agave toumeyana</i>	2	..	Tr.
<i>Agave vilmoriniana</i>	1	..	0.4
<i>Agave spp.</i>	3	Tr.	0.8
<i>Furcraea cabuya</i>	1	..	0.1
<i>Furcraea spp.</i>	3	..	Tr.
<i>Manfreda spp.</i>	7	0.1	0.7
<i>Yucca peninsularis</i>	4	0.2	0.6
<i>Yucca whipplei</i>	1	..	0.3
<b>HECOGENIN</b>			
<i>Agave angustifolia</i>	1	..	0.7
<i>Agave appplanata</i>	1	..	Tr.
<i>Agave aurea</i>	4	0.05	0.7
<i>Agave aurea x sobria</i>	1	..	0.4
<i>Agave brandegeei</i>	5	0.3	0.5
<i>Agave cerulata</i>	9	Tr.	1.7
<i>Agave desertii</i>	1	..	0.3
<i>Agave deweyana</i>	1	..	Tr.
<i>Agave ferox</i>	1	..	0.2
<i>Agave goldmaniana</i>	3	Tr.	0.5
<i>Agave letonae</i>	1	..	Tr.
<i>Agave lophantha</i>	1	..	Tr.
<i>Agave mapisaga</i>	1	..	Tr.
<i>Agave nelsonii</i>	1	..	0.4
<i>Agave mirabilis</i>	1	..	0.2
<i>Agave mitraformis</i>	1	..	0.2
<i>Agave nelsonii</i>	5	Tr.	0.7
<i>Agave pampaniniana</i>	1	..	0.4
<i>Agave promontorii</i>	9	0.1	1.8
<i>Agave roseana</i>	4	Tr.	1.0
<i>Agave aff. schidigera</i>	1	..	Tr.
<i>Agave sobria</i>	5	0.1	0.3
<i>Agave sullivanii</i>	1	..	0.5
<i>Agave toumeyana</i>	2	0.4	0.5
<i>Agave verschaffeltii</i>	1	..	Tr.
<i>Agave vexans</i>	2	0.2	0.4
<i>Agave spp.</i>	6	Tr.	1.5
<i>Furcraea spp.</i>	6	Tr.	0.2
<i>Manfreda spp.</i>	1	..	Tr.
<i>Yucca peninsularis</i>	3	0.1	0.5
<b>KAMMOGENIN</b>			
<i>Yucca filamentosa</i>	1	..	0.3
<b>MANOGENIN</b>			
<i>Agave appplanata</i>	1	..	Tr.
<i>Agave aurea</i>	2	..	Tr.
<i>Agave aurea x sobria</i>	1	..	Tr.
<i>Agave brandegeei</i>	3	..	Tr.
<i>Agave cerulata</i>	9	Tr.	0.5
<i>Agave desertii</i>	1	..	Tr.
<i>Agave deweyana</i>	1	..	Tr.

Contd. page 684

TABLE II.—Contd.

Species	No. of Sam- ples	Genin Content	
		—M. F. B., %	Max.
<b>MANOGENIN</b>			
<i>Agave ferox</i>	1	..	Tr.
<i>Agave fourcroydes</i>	1	..	Tr.
<i>Agave funkiana</i>	1	..	Tr.
<i>Agave goldmaniana</i>	3	Tr.	0.4
<i>Agave mirabilis</i>	1	..	Tr.
<i>Agave nelsonii</i>	7	Tr.	1.0
<i>Agave promontorii</i>	7	..	Tr.
<i>Agave roseana</i>	1	..	Tr.
<i>Agave scabra</i>	1	..	0.4
<i>Agave aff. schidigera</i>	1	..	Tr.
<i>Agave sobria</i>	4	Tr.	0.2
<i>Agave sullivanii</i>	1	..	0.7
<i>Agave toumeyana</i>	2	0.3	0.4
<i>Agave vexans</i>	2	..	Tr.
<i>Agave spp.</i>	3	..	Tr.
<i>Furcraea cabuya</i>	1	..	0.1
<i>Furcraea spp.</i>	3	..	Tr.
<i>Manfreda sp.</i>	1	..	0.4
<b>MARKOGENIN</b>			
<i>Yucca schidigera</i>	1	..	0.4
<b>SARSASAPOPENIN</b>			
<i>Agave sp.</i>	1	..	0.8
<i>Yucca schidigera</i>	4	0.5	1.3
<b>SMILAGENIN</b>			
<i>Agave cf. funkiana</i>	1	..	0.5
<i>Agave marmorata</i>	2	0.05	0.6
<i>Agave vilmoriniana</i>	3	0.8	3.2
<b>TIGOGENIN</b>			
<i>Agave appplanata</i>	1	..	Tr.
<i>Agave aurea</i>	1	..	Tr.
<i>Agave aurea x sobria</i>	1	..	Tr.
<i>Agave brandegeei</i>	3	Tr.	1.8
<i>Agave cerulata</i>	4	..	Tr.
<i>Agave deweyana</i>	1	..	0.05
<i>Agave ferox</i>	1	..	Tr.
<i>Agave fourcroydes</i>	1	..	0.2
<i>Agave funkiana</i>	1	..	0.3
<i>Agave goldmaniana</i>	1	..	Tr.
<i>Agave letonae</i>	1	..	0.1
<i>Agave lophantha</i>	1	..	0.2
<i>Agave mapisaga</i>	1	..	Tr.
<i>Agave mirabilis</i>	1	..	Tr.
<i>Agave nelsonii</i>	5	Tr.	1.2
<i>Agave promontorii</i>	7	Tr.	0.5
<i>Agave roseana</i>	4	Tr.	0.9
<i>Agave schottii</i>	1	..	Tr.
<i>Agave sobria</i>	3	..	Tr.
<i>Agave sullivanii</i>	1	..	Tr.
<i>Agave toumeyana</i>	1	..	0.1
<i>Agave verschaffeltii</i>	3	0.2	0.6
<i>Agave spp.</i>	6	0.1	0.4
<i>Furcraea cabuya</i>	1	..	0.2
<i>Furcraea spp.</i>	6	0.2	0.7
<i>Manfreda spp.</i>	3	0.3	0.4
<i>Yucca peninsularis</i>	6	0.2	2.0
<i>Yucca whipplei</i>	3	0.7	0.9
<i>Yucca sp.</i>	1	..	0.9
<b>YAMOGENIN</b>			
<i>Agave cf. funkiana</i>	1	..	0.1
<i>Agave vilmoriniana</i>	1	..	0.4
<i>Dioscorea barlettii</i>	3	0.3	0.4
<i>Dioscorea composita</i>	1	..	0.5
<i>Dioscorea macrostachya</i>	1	..	0.05
<i>Dioscorea spiculiflora</i>	2	0.4	0.9
<i>Dioscorea spp.</i>	13	0.5	2.1

Practically all *Agave*, *Dioscorea*, and *Yucca* contained saponins but the proportion of steroid saponins was, respectively, 60, 34, and 80%.

Two new steroid saponins are reported in this list. They are the isomeric gentrogenin and correllogenin, from two lots of *D. spiculiflora* and from one unidentified *Dioscorea*, all from Chiapas, Mexico. A preliminary description of their chemistry has been published (7). They always seem to occur with diosgenin and yamogenin. Two other new steroid saponins have recently been found: ruscogenin from *Ruscus aculeatus* (8) and rhodeasapogenin from *Rhodes japonica* (9).

A few new records of high content of saponins are reported: 1.85% hecogenin in *Agave promontorii*, 1.0% manogenin in *A. nelsonii*, 3.2% smilagenin in *A. vilmoriniana*, and 2.1% yamogenin in a *Dioscorea* sp.

For the first time in this series the saponins of *Furcraea* could be identified. Tigogenin, gitogenin, manogenin, and hecogenin were found—the highest total being 1.3%.

Steroidal saponins are reported in 10 new species of *Dioscorea* and in 20 new species of *Agave*.

Flavonoids were found in 48 species, of which 42 are new to the record.

Alkaloids were found in eight species, of which the following are new to the record: *Urechites lutea* (Apocynaceae); *Albizia polyphylla*, *Lupinus diffusus*, *L. villosus* (Leguminosae).

Tannins were absent in the 53 species of Composite so far examined. In the other families in the present list there are too few collections for generalizations to be drawn.

Unsaturated sterols continued to be of common occurrence.

*Ficus* is not a promising genus for the group of constituents sought in this series. Fifty-nine species have yielded practically nothing but sterols. Similarly, *Agave*, *Yucca*, and *Dioscorea* have given so few positive tests for all four nonsteroid groups that in the present series we have not made the tests.

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# A Potent Pyrogenic Extract Derived from a Strain of *Aerobacter aerogenes*\*

Utilizing a simple technic, a good yield of pyrogenic material has been obtained from a strain of *Aerobacter aerogenes*. This dried product consistently elicits pyrogenic response in rabbits in dilutions of approximately 1:100,000,000 (0.01 µg./ml.) and is relatively stable to dry heat when exposed to 120° for forty minutes.

LITERALLY HUNDREDS of pyrogenic preparations have been described in the literature in the years that have intervened since Hort and Penfold (1), and Seibert (2) first recognized and investigated these often troublesome substances more than three decades ago. Since then much has been learned of their physical and chemical properties which, though varying to some degree in the individual materials isolated, have shown many characteristics in common. Moreover, information has accumulated recently which indicates that they have a possible place as a chemotherapeutic adjunct (3-6). In this connection, as well as in the interest of learning more of the basic mode of action of such a substance in the animal body, the present work has been undertaken.

By means of a simple method an excellent yield of a high potency pyrogen has been obtained. It is heat stable, and varies little in the two separate batches prepared as to hygroscopicity and certain other physical properties. Its preparation, potency, and heat stability will be discussed in this preliminary report.

## MATERIALS AND METHODS

The extraction method employed is essentially that suggested by Fischbach and Levine (7) of the Food and Drug Administration. A strain of *Aerobacter aerogenes* (#114) isolated from a commercial streptomycin sample was the organism used. Carboys of 20-liter capacity, provided with spargers and sterile air intakes and containing Koser's<sup>1</sup> medium were seeded with this organism. At a constant temperature of 37° with minimum airflow agitation, growth was allowed to proceed for three to four days. At the end of this period, the entire contents was subjected to flash evaporation and re-

duced to one-fifth of the original volume. Four volumes of acetone were added to the concentrate and mixed with a mechanical stirrer for one-half hour. The precipitate was allowed to settle overnight at room temperature and the supernatant fluid decanted and discarded. A small amount of water was added to the precipitate to form a slurry, and this mixture was poured into a side-arm suction flask. At a temperature of 37° under reduced pressure, all of the residual acetone was boiled off. The mucoid material which separated out at this point was kept apart for future testing. The liquid portion was placed in the refrigerator overnight, and all formed crystals discarded. The remaining liquid was passed through a 3.5 x 120-cm. ion exchange column containing Amberlite® (MB-3) which had been suspended in distilled water and the water removed. The rate of flow of liquid through the column was approximately 5 ml. per minute. The material was allowed to flow until the column was three-quarters exhausted. The column was then emptied, refilled with Amberlite, and the remaining liquid passed through. The final pH of the liquid so treated was approximately 5.0. This was lyophilized and the final, dried product subjected to grinding, using either a ball mill or mortar and pestle. The approximate yield of powder thus prepared was 5.0 Gm. from 240 liters of Koser's citrate broth.

A multiple dose method, proposed by one of us (RJR), utilizing single rabbits was employed in the determination of pyrogen titers. Beginning with the least amount of material in solution in any single test, four intravenous injections of increasing concentration were made at two-hour intervals. Prior to the initial injection, a control temperature was taken and subsequent temperatures were measured at hourly intervals. The highest rise within each two-hour interval, compared to the control temperature, was used to determine the pyrogen titer. Dose response in rabbits so treated was found to be reproducible within acceptable limits.

## RESULTS AND DISCUSSION

Two batches of material were prepared and compared to a material presently used by this laboratory as a pyrogen "House Standard." The latter was obtained by extraction from a strain of *Pseudomonas aeruginosa* in the manner here described. Each batch was tested in rabbits. The multiple dose method was checked in two instances by the injection of single levels in several rabbits with good comparative results. Table I shows the temperature rise obtained in rabbits injected with the indicated amounts of material.

In order to determine the extent of any cumulative effect of this titration method in rabbits, sub-pyrogenic doses (on the basis of previously determined pyrogenic titer) were injected into 10 rabbits

\* Received March 21, 1957, from the Division of Antibiotics; Food and Drug Administration; Department of Health, Education, and Welfare; Washington, D. C.

<sup>1</sup> A simple Koser's Citrate Medium (dehydrated) was used to avoid extraneous protein material (Difco Laboratories, Inc., Detroit, Mich.).

TABLE I.—POTENCY MULTIPLE DOSE METHOD.  
DEGREES TEMPERATURE RISE OBTAINED IN INJECTED RABBITS

	Hrs. after Control Temperature			
	2	4	6	8
	μg./ml.			
Batch 1	0.005	0.01	0.02	0.04
	0.3	0.7	1.1	1.5
	0.4	0.5	1.1	1.7
	0.4	0.9	0.9	1.6
Av.*	0.36	0.70	1.03	1.60
Batch 2	0.5	1.0	1.6	1.7
	1.5	2.5	2.7	2.8
	0.9	1.5	2.2	2.6
Av.*	0.96	1.66	2.17	2.37
Present "House Standard"	0.04	0.1	0.2	1.0
	0.2	0.5	0.8	1.4
	0.3	0.6	0.6	1.1
Av.*	0.25	0.55	0.70	1.25

\* The averages given for Batch 1 represent the multiple dose assay results obtained in three rabbits. Three rabbits were used to obtain the average figures for Batch 2. Two rabbits were used in obtaining the averages presented for the "house standard" material.

using the multiple dose technique. Of 40 temperature observations made, nine gave rises of  $0.6^{\circ}$  or more, eight of the nine in the sixth and eighth hour. The same rabbits were retested after a two-week rest period. Of 40 temperature observations made on these, rises of  $0.6^{\circ}$  or more were observed seven times, all in the sixth- and eighth-hour period. It may be said that there is some indication of a cumulative pyrogenic effect using this method, although this in no way invalidates the responses observed in the greatest dilution utilized in the test, since here no prior injection had been made. As far as pyrogen tolerance is concerned, it is not thought, on the basis of present knowledge, that this can be built up in a matter of hours. Days at least are required before resistance to these materials appears in rabbits.

In order to determine the heat stability of these materials, weighed aliquots were heated in an oven for forty minutes at  $120^{\circ}$ . Table II compares the pyrogenic rise obtained in different batches under these conditions.

It can be seen from these results that activity remained in both batches after heating, although it was necessary to increase injected amounts from two- to eight-fold in order to elicit a pyrogenic response. This indicates a relatively heat-stable product when compared to the present pyrogen "house standard," which, when increased ten-fold in concentration failed to give temperature rises in rabbits, under similar conditions. The batches of *A. aerogenes* pyrogen were much alike in their initial high activity in rabbits and heat stability under the conditions imposed, and differed only slightly in

TABLE II.—HEAT STABILITY. DEGREES TEMPERATURE RISE ELICITED IN RABBITS BY MATERIAL HEATED FOR FORTY MINUTES AT  $120^{\circ}$

	Hrs. after Control Temperature			
	2	4	6	8
	μg./ml.			
Batch 1 <sup>a</sup>	0.01	0.02	0.04	0.1
	0.4	0.6	0.7	1.3
Batch 2 <sup>a</sup>	0.2	0.4	0.7	0.9
	0.2	0.4	1.0	2.0
Present "House Standard"	0.2	0.3	0.3	0.5
	0.1	0.0	0.2	0.4
Av.	0.15	0.15	0.25	0.45

<sup>a</sup> In single rabbits Batches 1 and 2 gave the indicated temperature rises above the control temperatures. The "house standard" material was tested in duplicate.

TABLE III.—ELEMENTAL CHEMICAL ANALYSIS (PER CENT) OF THREE PYROGEN PREPARATIONS

	Batch 1	Batch 2	"House Standard" Pyrogen
Moisture	7.75	7.57	5.52
Nitrogen	8.74	6.80	9.06
Hydrogen	7.58	7.64	6.94
Carbon	47.72	46.56	46.60
Sulfur	0.78	0.49	0.69
Phosphorus	0.85	0.94	3.74

their physical properties. Table III presents their elemental chemical analysis and moisture content.

Toxicity tests performed intravenously in 19-21 Gm. mice gave an  $LD^0$  of 500  $\mu$ g./mouse and an  $LD^{100}$  of 5000  $\mu$ g./mouse in forty-eight hours. The material has not been tested for antigenicity.

The activity of these pyrogen preparations represents a 20- to 40-fold increase in activity over the *Pseudomonas* preparation presently in use as a "house standard" and compares favorably with the most active preparations reported in the literature thus far (8-10).

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